SEABIRD MONITORING AND RESPONSE TO INDEPENDENCE DAY FIREWORKS DISPLAYS AT TWO LOCATIONS WITHIN OREGON ISLANDS NATIONAL WILDLIFE REFUGE, OREGON

(Photo: David B. Ledig/USFWS)

By

Shawn W. Stephensen, Roy W. Lowe, William T. Bridgeland, and David B. Ledig

U.S. Fish and Wildlife Service
Oregon Coast National Wildlife Refuge Complex
2127 SE Marine Science Drive
Newport, Oregon 97365

May 14, 2012

Cite as: Stephensen, S.W., R.W. Lowe, W.T. Bridgeland, and D.B. Ledig. 2012. Seabird monitoring and response to Independence Day fireworks displays at two locations within Oregon Islands National Wildlife Refuge, Oregon. U.S. Fish and Wildlife Service Unpublished Report, Oregon Coast National Wildlife Refuge Complex, Newport, Oregon. 125 pp.

EXECUTIVE SUMMARY

Oregon supports 1.3 million seabirds of fifteen species, with 393 breeding colonies distributed along all parts of the coast. The majority of colony sites are located within Oregon Islands and Three Arch Rocks National Wildlife Refuges (NWR), which are designated as Wilderness Area. Seabirds play an important role in the marine ecosystem and their populations must be protected and closely monitored. Seabirds are extremely sensitive to human disturbance and single disturbance events can cause mortality of eggs and young or result in colony abandonment by adults. One source of disturbance that has been little studied is the impact of large-scale celebratory fireworks near seabird colonies, which can occur during a critical period (July) of the seabird nesting season.

In this study, we examined potential responses and effects on local seabird population abundances (daily counts) and reproductive success from commercial Independence Day fireworks displays at two locations within Oregon Islands NWR including Pirate Cove Rock, Depoe Bay, Lincoln County and rocks adjacent to Coquille Point, Bandon, Coos County, Oregon. The study area consisted of two treatment sites: Pirate Cove Rock and Coquille Point Seabird Colony Complex; and two reference sites: Yaquina Head Seabird Colony Complex and Gregory Point Seabird Colony Complex. We conducted daily counts of six seabird species and monitored nests of Brandt's cormorants, double-crested cormorants, pelagic cormorants, western gulls, and black oystercatchers from land vantage points. We also conducted aerial photographic surveys to document numbers of nests and nest fate for each colony. In addition, we examined bird behavior prior to and during the fireworks display using night-vision camera equipment that recorded night-time still-frame and video images.

We documented 4.8% Brandt's cormorant nest failure at Pirate Cove Rock. Nine of the eleven (82%) total failed Brandt's cormorant nests occurred within two days immediately after the 03 July Depoe Bay fireworks display. One of eleven (9%) pelagic cormorant nests failed at Pirate Cove Rock on 04 July after the Depoe Bay fireworks event. Fireworks disturbance is suspected to be the primary cause of these Brandt's and pelagic cormorant nest failures. We did not document seabird nest failure at Coquille Point Seabird Colony Complex as a result of the fireworks display. Brandt's cormorants experienced a total of 11% nest failure at Yaquina Head Seabird Colony Complex as a result of avian depredation events that occurred throughout the breeding season. Brandt's cormorants at Gregory Point Seabird Colony Complex experienced no nest failure. Night-time video monitoring and sound recording during the 03 July fireworks display recorded visible disturbance of both Brandt's cormorants and western gulls at Pirate Cove Rock. Cormorants and gulls exhibited nervous behavior such as head-bobbing, erect posturing, and loud vocalization. Birds also flushed at the beginning and throughout the duration of the fireworks display. However, similar monitoring at the Coquille Point Seabird Colony Complex recorded little disturbance to seabirds during the 04 July fireworks display. Birds exhibited slight nervous behavior, but did not flush from the colony. We detected no change of seabird abundance or trends in daily counts before or after the fireworks display, suggesting that bird presence at Pirate Cove Rock and Coquille Point Seabird Colony Complex was not affected by the fireworks displays.

Seabirds are protected under the Migratory Bird Treaty Act of 1918. The statute makes it unlawful to pursue, hunt, take, capture, kill, or sell migratory birds. When seabirds occur on Refuge lands they receive further protection under provisions of the National Wildlife Refuge System Administration Act as amended by the NWRS Improvement Act (16 USC 668dd-668ee) and 50 CFR. In addition, it is declared unlawful within a wilderness designated reservation to "take or disturb any wild animal or bird, or their nests or eggs." Since mortality of eggs, chicks, or abandonment of nests and disturbance to seabirds occurred as a result of nearby fireworks, U.S. Fish and Wildlife Service must take steps to ensure protection of seabirds. It is our best professional judgment that fireworks launch sites should be greater than 2 km from any existing surface–nesting seabird colony to avoid potential disturbance. In addition, we suggest use of a less powerful and narrow spectrum selection of fireworks to lessen impacts to seabirds. Fireworks should be launched in a direction away from the colony to help reduce noise and light.

TABLE OF CONTENTS

List of Appendices

List of Appendices (cont.)

List of Tables

List of Tables (cont.)

List of Figures

List of Figures (cont.)

INTRODUCTION

Oregon supports a large concentration of seabirds, with breeding colonies distributed along all parts of the coast. Fifteen species totaling 1.3 million individuals breed in Oregon (Naughton et al. 2007). Approximately 393 individual seabird nesting colonies have been documented, which range in size from a few pairs to several hundred thousand birds. Most Oregon seabird colonies are within the boundaries of the Oregon Islands and Three Arch Rocks National Wildlife Refuges (NWRs), which are administered by the United States Fish and Wildlife Service (USFWS). The seabird populations that nest within Oregon Islands and Three Arch Rocks NWRs are of regional and national importance constituting nearly 50% of the nesting population within California, Oregon, and Washington combined (USFWS 2009).

Seabirds play an important role in the marine ecosystem and their populations must be protected and closely monitored. The Federal government has the responsibility of assuring the conservation of migratory birds. That responsibility is guided by several laws that are administered primarily by the USFWS. Seabirds are protected by the Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712). This act established Federal responsibility for the protection of migratory birds and gave effect to treaties in Canada, Mexico, Japan, and Russia. The act is basic to protecting populations and habitats of migratory birds, managing their distribution, ecological diversity, introduction and restoration, and guiding research programs. The statute makes it unlawful to pursue, hunt, take, capture, kill, or sell migratory birds. The USFWS also has trust responsibility and legal authority to protect and manage seabirds on Refuge lands. When nesting seabirds occur on Refuge lands they receive further protection under provisions of the National Wildlife Refuge System Administration Act of 1966 and Title 50 of the Code of Federal Regulations (CFR). By law, refuges are to be managed to achieve their purposes as specified by the National Wildlife Refuge System Improvement Act of 1997 (16 USC 668dd-668ee). The Oregon Islands NWR purposes include (partial list): to provide refuge and breeding grounds for wild birds and animals; for use as an inviolate sanctuary or for any other management purpose for migratory birds; and to provide suitable nesting habitat and offer nesting protection for seabirds (USFWS 2009).

The Oregon Islands and Three Arch Rocks NWRs include nearly all rocks, reefs, and islands along the Oregon Coast that are above the surface of the ocean and are separated from the mainland at mean high tide. In addition to NWR status, all of the rocks, reefs, and islands within these Refuges are designated as Wilderness Areas (Oregon Islands Wilderness and Three Arch Rocks Wilderness) with the exception of Tillamook Rock. These NWR lands were acquired to serve as a refuge and breeding ground for seabirds and marine mammals, and wilderness designation was intended to complement and strengthen existing protections for wildlife (USFWS 2009). The Wilderness Management Plan (USFWS 1980) and the Wilderness Act of 1964 (P.L. 88-577) defines a wilderness as “an area where the earth and its community of life are untrammeled by man, where man himself is a visitor and does not remain. In addition, these areas are without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions.” It is declared unlawful within a wilderness designated reservation to “take or disturb any wild animal or bird, or their nests or eggs; to destroy any natural growth; or to burn it” (USFWS 2009).

These wilderness areas are closed to all public entry to protect and conserve these sensitive natural resources for future generations of Americans.

Seabirds (especially cormorant species) are extremely sensitive to human disturbance and single disturbance events can cause mortality of eggs and young or result in colony abandonment by adults (Weigand and McChesney 2008). Sources of human disturbance that are well recognized include light intrusion, flying of model aircraft and kites, close-approaching boats, humans on foot near or within colony sites, and low-flying aircraft (McChesney 1997, Riemer and Brown 1997, Carney and Sydeman 1999, Rojek et al. 2007, Stephensen 2009). Management that limits disturbances to seabirds during their reproductive cycles is critical to preserve and protect sensitive seabird populations. One source of disturbance that has recently been documented is the impact from the discharge of commercial or large-scale community celebratory fireworks near seabird colonies (Weigand and McChesney 2008). Weigand and McChesney (2008) documented nest abandonment by Brandt's cormorants (*Phalacrocorax penicillatus*) associated with a single-day fireworks disturbance event at Gualala Point Island, Sonoma County, California. Another California study of great blue herons (*Ardea herodias*), a colonial waterbird, assessed chick mortality associated with fireworks during the breeding season in Humboldt Bay (Wengert and Gabriel 2002). In Oregon, studies of fireworks and potential impacts to seabirds had not been conducted prior to this study.

During the 03 July 2010 Independence Day fireworks event at Depoe Bay, Oregon, seabirds flushed at the Pirate Cove Rock colony and were observed by a local resident who reported it to USFWS personnel several days later. The fireworks launch site is within Boiler Bay State Park 1.21 km north of the Pirate Cove Rock seabird colony. In addition, during the annual Independence Day fireworks celebration at Bandon, Oregon, seabird disturbance at the Coquille Point Seabird Colony Complex has also been reported by local residents. The fireworks launch site is located on the north spit of the Coquille River 2.19 km northeast of the Coquille Point Seabird Colony Complex. Detonation of fireworks close to active seabird colonies has a high likelihood of being detrimental to nesting seabirds (Weigand and McChesney 2008). If nest failures occur, this constitutes a "take" as defined by the Migratory Bird Treaty Act. "Take" the regulations state, "means to pursue, hunt, shoot, wound, kill, trap, capture, or collect" or to attempt the foregoing to any migratory bird, [or] any part, nest, or eggs of any such bird (50 CFR. §10.12).

The USFWS conducted a monitoring study at Pirate Cove Rock during 2011 to determine if the Independence Day fireworks display had any adverse effects on seabirds, particularly breeding success. USFWS also included the Coquille Point Seabird Colony Complex as a monitored site due to similar concerns at that location. To assess potential impacts, USFWS biologists monitored seabirds before, during, and after the fireworks displays using a combination of aerial and land-based techniques. The objective of this study was to document any level of fireworks-related impacts, including identifying any potential disturbance, "take", or 50 CFR violations to surface-nesting colonial seabirds near the fireworks display locations during Independence Day celebrations.

METHODS

Study Area

The study area consisted of two seabird colony treatment sites in close proximity to fireworks displays: Pirate Cove Rock near Depoe Bay and Coquille Point Seabird Colony Complex near Bandon; and two seabird colony reference sites: Yaquina Head Seabird Colony Complex near Newport and Gregory Point Seabird Colony Complex near Coos Bay (Figure 1). All Oregon seabird colonies have been given a unique seabird colony number designation (Naughton et al. 2007), and numbers will be shown the first time each seabird colony is mentioned in the methods section.

Figure 1. Map of coastal Oregon indicating seabird colony treatment and reference site locations within the study area.

Pirate Cove Rock (colony # 243-000.3) treatment site is located north of the city of Depoe Bay, Oregon at 44° 49’ 11” N, 124° 4’ 1” W. The fireworks launch site is approximately 1.21 km to the north of Pirate Cove Rock at 44° 49’ 49” N, 124° 3’ 56” W (Figure 2). Pirate Cove Rock is situated between a residential neighborhood to the south and WorldMark by Wyndham® timeshare vacation property to the east and north. Since 1988, Pirate Cove Rock has supported 200-300 pairs of nesting seabirds including Brandt’s cormorant, pelagic cormorant (*Phalacrocorax pelagicus*), western gull (*Larus occidentalis*), glaucous-winged gull (*Larus glaucescens*), pigeon guillemot (*Cepphus columba*), and black oystercatcher (*Haematopus bachmani*) (Naughton et al. 2007).

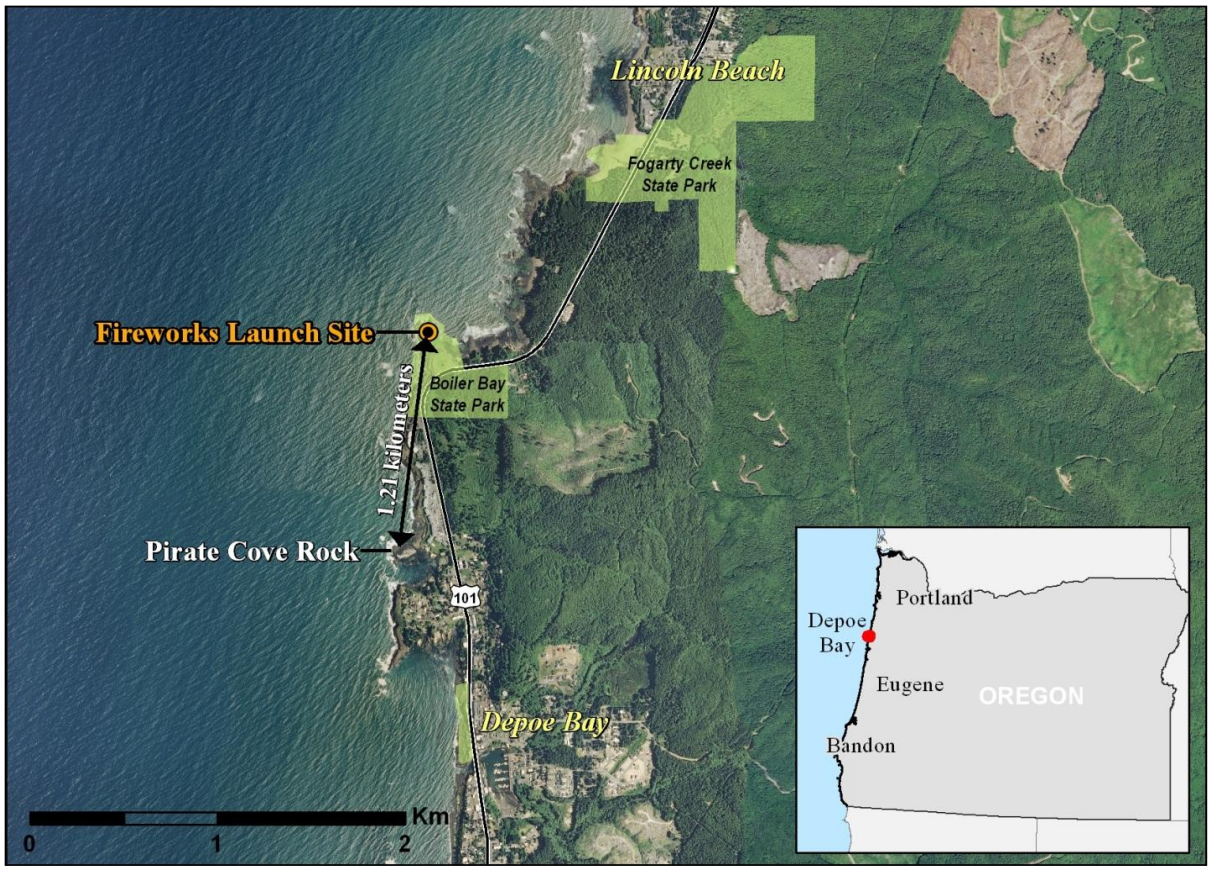


Figure 2. Satellite image of the City of Depoe Bay, Pirate Cove Rock Seabird Colony, and fireworks launch site location.

Yaquina Head Seabird Colony Complex (colony #’s 243-011 to 243-021) reference site is located at 44° 40’ 40” N, 124° 4’ 49” W north of the city of Newport and approximately 22 km south of Pirate Cove Rock (Figure 1). The closest large-scale fireworks display to this reference site is located 6.5 km south at Yaquina Bay adjacent to Newport. This colony complex supports the same seabird species as Pirate Cove Rock in addition to the largest common murre (*Uria aalge*) colony (approximately 86,000 birds) in Oregon (USFWS unpublished data).

Coquille Point Seabird Colony Complex treatment site is located at 43° 6’ 52” N, 124° 26’ 20” W south of the Coquille River confluence and west of Coquille Point near the city of Bandon (Figure 1). Specific focal seabird colonies monitored include Table Rock (colony # 270-014), North Coquille Point Rock (colony # 270-015), and Middle Coquille Point Rock (colony # 270-016). The fireworks launch site is located at 43° 7’ 3” N, 124° 25’ 2” W approximately 2.19, 2.12, and 1.84 km northeast of North Coquille Point Rock, Middle Coquille Point Rock, and Table Rock, respectively (Figure 3). The entire colony complex consists of eight separate colonies. Since 1988, this complex has supported approximately 23,000 individual breeding seabirds including common murre, Brandt’s cormorant, pelagic cormorant, double-crested cormorant (*Phalacrocorax auritus*), western gull, glaucous-winged x western gull hybrids (*Larus occidentalis x Larus glaucescens*), pigeon guillemot, tufted puffin (*Fratercula cirrhata*), and black oystercatcher (Naughton et al. 2007).

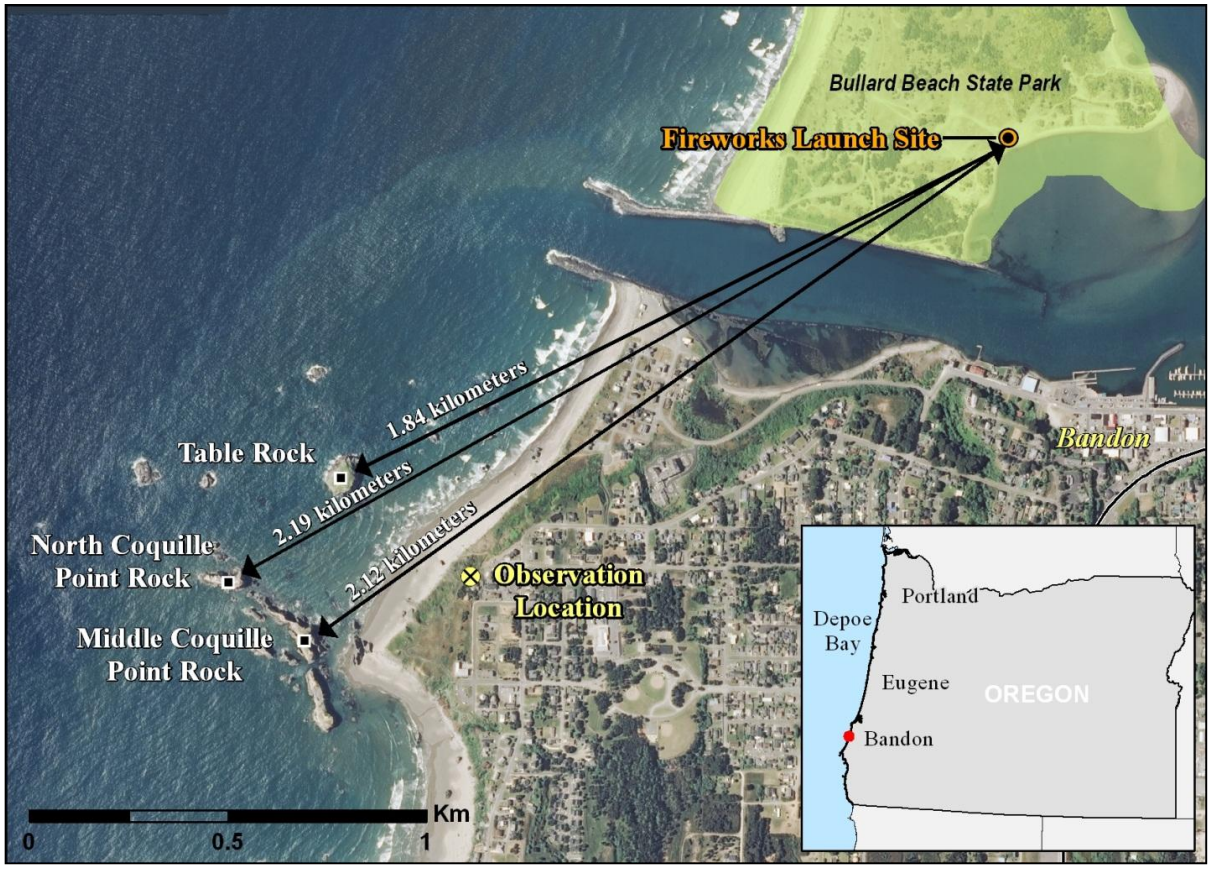


Figure 3. Satellite image of the City of Bandon, Coquille Point Seabird Colony Complex, and fireworks launch site location.

The Gregory Point Seabird Colony Complex reference site is located at 43° 20’ 34” N, 124° 22’ 34” W north of Sunset Bay State Park and 4 km west of the City of Charleston (Figure 1). Specific focal seabird colonies monitored include Chiefs Island (colony # 270-004) and Unnamed Colonies (#’s 270-004.1, 270-004.2, 270-005). Since 1988, this complex has supported approximately 1,500 individual breeding seabirds including common murre, Brandt’s cormorant, pelagic cormorant, double-crested cormorant, western gull, glaucous-

winged x western gull hybrids, pigeon guillemot, rhinoceros auklet (*Cerorhinca monocerata*), tufted puffin, and black oystercatcher (Naughton et al. 2007). The nearest large-scale fireworks display is located 13.5 km east at Coos Bay.

Monitoring

This study was designed as a Before After Control Impact (BACI) experiment (Smith 2002) with paired treatment-reference sites. This type of experimental study design is used widely in scientific studies wherein treatment and reference sites are designated and data collected from the different sites are compared. In this study, the design is used to identify factors that may contribute to seabird disturbance or reduced productivity by comparing sites that are exposed (treatment) to a specific disturbance type (fireworks) with sites that do not have the disturbance factor but are otherwise similar (reference). Pirate Cove Rock treatment site data were compared to Yaquina Head Seabird Colony Complex reference site data and Coquille Point Seabird Colony Complex treatment site data were compared to Gregory Point Seabird Colony Complex reference site data. This comparison enables researches to ensure other human or natural disturbance (avian predators, or non-fireworks disturbance) is recorded in a controlled situation.

The overall study period ranged from 01 June to 02 September 2011, including an intensive core monitoring period from 27 June to 10 July. The annual Independence Day fireworks displays for the communities of Depoe Bay and Bandon occurred on the evenings of 03 and 04 July respectively. The objective of the monitoring was to characterize bird behavior and nest status during approximately six day periods before and after the fireworks (27 June to 10 July; core monitoring period), and to determine if any significant changes corresponded to the disturbance events. Additional observations earlier and later in the nesting season (between 01 June and 02 September) were conducted to determine the configuration of the colonies and the longer term fate of monitored nests respectively. We monitored all six surface-nesting seabird species that nested at the treatment and reference sites to determine the possible effects of fireworks displays. Brandt's cormorant, pelagic cormorant, western gull, pigeon guillemot, and black oystercatcher were monitored at Pirate Cove Rock and Coquille Point Seabird Colony Complex. An additional species, double-crested cormorant was monitored at the Coquille Point Seabird Colony Complex and Gregory Point Seabird Colony Complex. Monitoring consisted of regular instantaneous counts of all visible seabirds, and daily tracking of nest status of visible nests.

Seabird Counts From Mainland Vantage Points

Counts of seabirds observed from the mainland vantage points at all sites were conducted four times per day (0700, 0900, 1100, and 1300 hrs) during the core monitoring period (27 June to 10 July). All breeding and non-breeding seabirds, except common murre, were counted on rocks, islands, and water within 100 m of land mass.

There were two mainland vantage points at the Pirate Cove Rock site. One USFWS observer was stationed to the east (WorldMark by Wyndham® timeshare property) of Pirate Cove Rock and one USFWS observer stationed to the south (residential area) to conduct daily

observations of the colony (Figure 4). The same observer remained at the same observation location throughout the core monitoring period. Seabirds were identified to species and counted with the aid of Canon 10x42 Image Stabilizer binoculars and Swarovski Habicht ST80 HD 80mm 20-60X zoom spotting scopes. The observer stationed east of Pirate Cove had a limited view of Brandt's and pelagic cormorants, but was able to observe all of the western gulls breeding at Pirate Cove Rock.

Figure 4. Aerial photograph of Pirate Cove Rock seabird colony and land-based observation locations (Photo: Shawn W. Stephensen/USFWS).

The area surveyed for seabirds at Yaquina Head Seabird Colony Complex reference site included 100 m south of Colony Rock (largest offshore island, colony # 243-015) northward to and including colony number 243-013 (Figure 5). All counts at the Yaquina Head Seabird Colony Complex reference site were conducted from the viewing platform deck west of the Yaquina Head Lighthouse. Seabirds were identified to species and counted by two USFWS observers with the aid of Canon 10x42 Image Stabilizer binoculars and Swarovski Habicht ST80 HD 80mm 20-60X zoom spotting scopes.

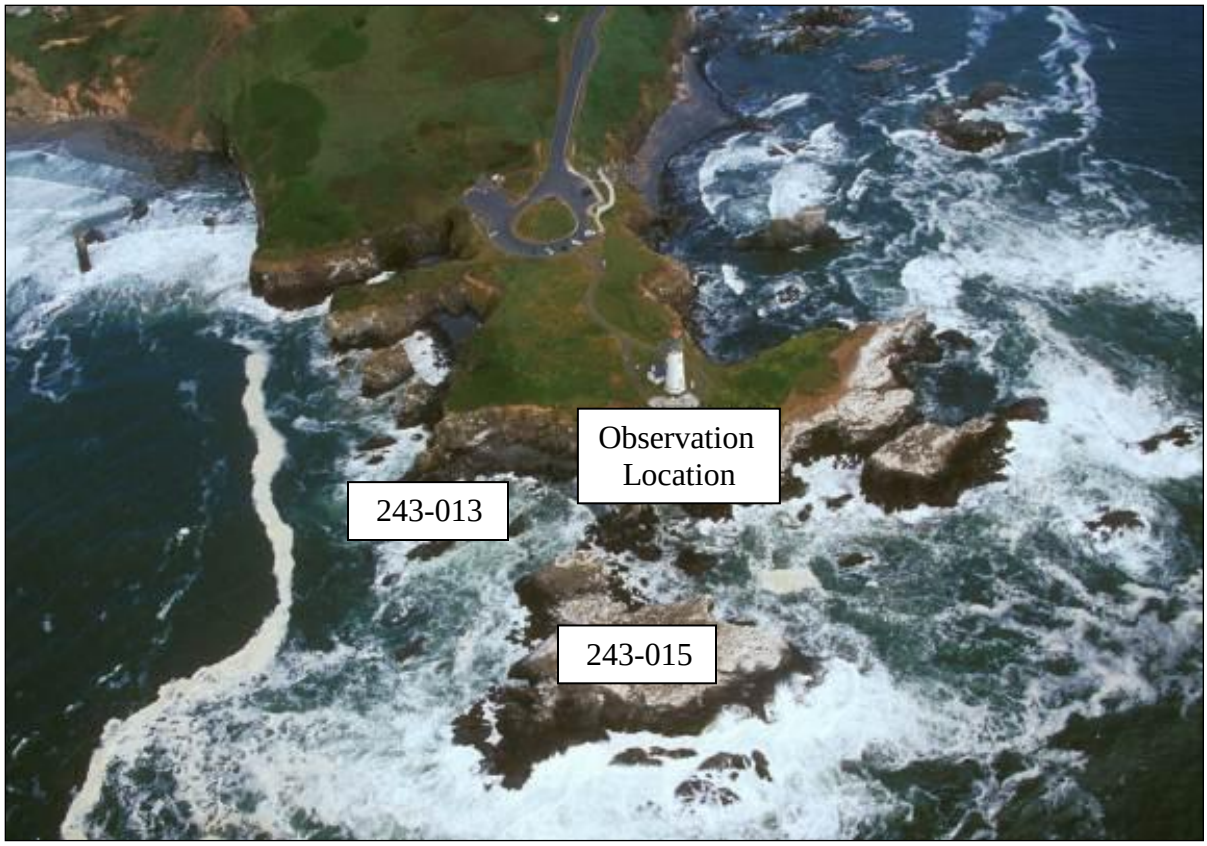


Figure 5. Aerial photograph of Yaquina Head Seabird Colony Complex and land-based observation location (Photo: Roy W. Lowe/USFWS).

One USFWS observer was stationed on the mainland at the Coquille Point Unit of the Oregon Islands NWR and monitored seabirds at focal colonies Table Rock, North Coquille Point Rock, and Middle Coquille Point Rock (Figure 3). All counts at the Coquille Point Seabird Colony Complex were conducted from the headland southwest of 8th street. Seabirds were observed and counted by the observer with the aid of Zeiss 10x42 binoculars and Kowa TSN-884 with 20-60X zoom spotting scope.

One USFWS observer was stationed at Gregory Point Seabird Colony Complex and monitored seabirds at Chiefs Island, Gregory Point Headland, and two unnamed offshore reefs (Figure 6). Seabirds were observed and counted by the observer with the aid of Canon 10x42 Image Stabilizer binoculars and Swarovski Habicht ST80 HD 80mm 20-60X zoom spotting scope.

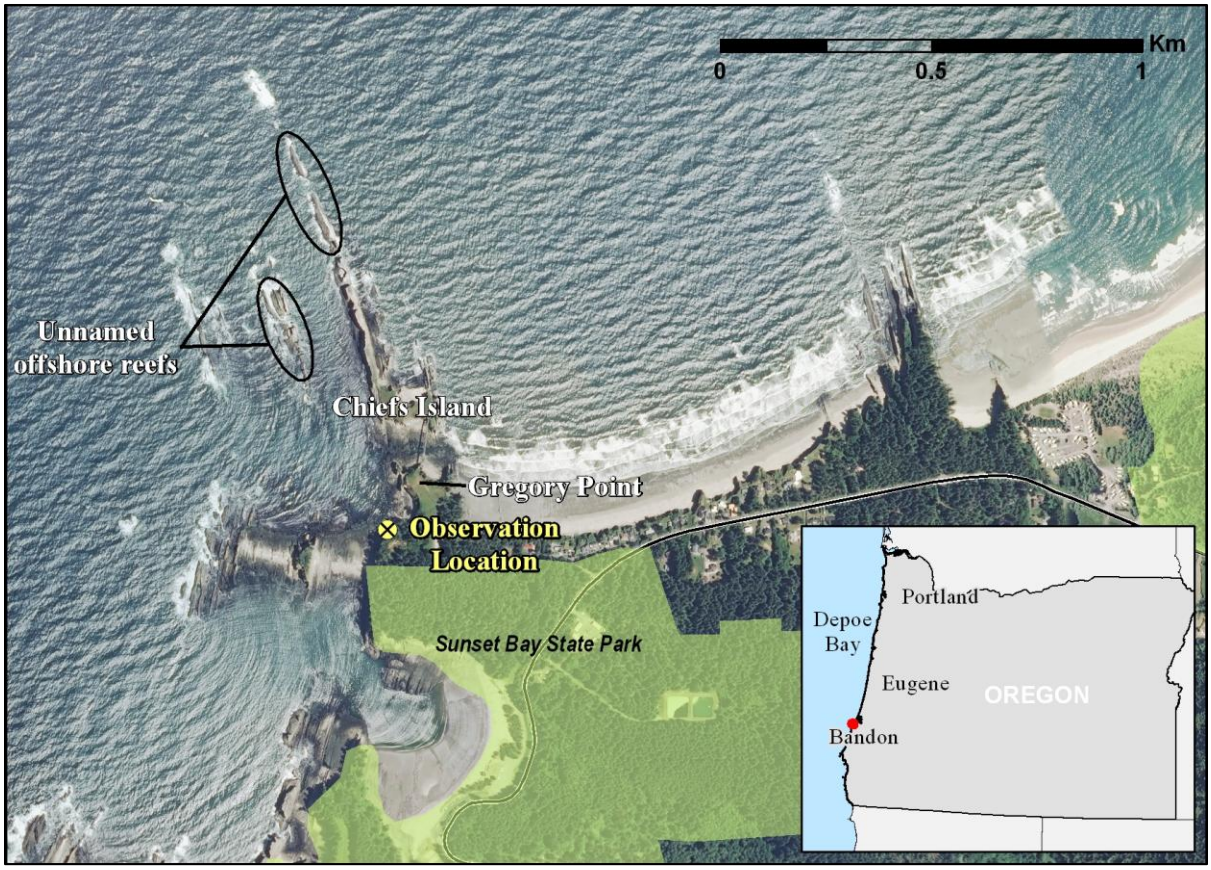


Figure 6. Satellite image of Gregory Point Seabird Colony Complex, focal colonies, and land-based observation location.

Seabird Nest Monitoring From Mainland Vantage Points

Visible nests of Brandt's cormorants, pelagic cormorants, double-crested cormorants, western gulls, and black oystercatchers were monitored during the core monitoring period of 27 June to 10 July from two mainland observation points at Pirate Cove Rock and from one vantage point at each of the other sites (Figures 3-6). To determine initial nest site locations for subsequent monitoring from the mainland, colonies at the treatment and reference sites were photographed at the onset of the core monitoring period from each mainland vantage point. Digital photographs were taken with a Canon 5D Mark II digital single lens reflex (DSLR) camera with a Canon Ultrasonic Image Stabilizer 100 - 400 mm lens and 1.4X teleconverter (photographs taken at 560 mm; 11.2X magnification) or an Olympus SP-590UZ digital camera with a 4.6 - 119 mm optical zoom lens (photographs taken at 119 mm; 26X magnification).

Nesting seabirds were identified to species and nests counted with the aid of optics following Weigand and McChesney (2008). Observations of all visible seabird nests were conducted for 7-8 hours per day and the following information was collected for each nest: site status (breeding, territorial, undetermined), nest condition (well-, fairly-, poorly-built, unclassified), nest contents (number of eggs and/or chicks), and adult bird activity as it related to breeding

(i.e., bird with eggs and/or chicks, incubating or brooding posture, or not present at site). Birds in a sitting position while incubating eggs on nest indicated "incubating posture." Birds in a semi-sitting or partial standing position with a chick underneath on nest indicated "brooding posture." See Appendix 5 for behavioral and observation code list and definitions.

Seabird Nest Monitoring Via Aerial Photography

Seabird nests were surveyed and monitored via land observations and by the use of aerial photography. The seabird nest data collected from mainland vantage points was limited since observers could not view each colony in its entirety. Whereas, aerial photographs provided a view of the entire colony and ideally all seabird nests could be monitored.

We conducted eight aerial photographic surveys of all sites on 01and 09 June; 02, 03, 04, 05, and 08 July; and 02 September. We used fixed-wing aircraft on all dates except 09 June to document locations and numbers of nests and nest success for each entire colony(s). We used a helicopter on 09 June as part of an annual USFWS aerial photographic survey of common murre and cormorant colonies of the Oregon coast. The helicopter doors were removed to allow for unobstructed views. A Canon EOS 5D Mark II digital SLR camera with a Canon Ultrasonic Image Stabilizer 100-400mm telephoto lens was used to photograph each colony.

The fixed-wing aircraft used was a Cessna 185, FAA registration number N185FS, operated by commercial pilot/owner Jack Christopherson of Wilderness Air Charters, Inc. Survey flight altitude ranged from 250 to 350 m above ground level (AGL) and aircraft speed ranged from 145 to 210 km/hr. Survey altitudes were flown high enough to alleviate disturbance to seabirds from this type of fixed-wing aircraft (Rojek et al. 2007, USFWS Aerial Photography Protocols). A Global Positioning System (GPS; Garmin GPSmap 76Cx) device was utilized throughout the survey to generate a real-time Geographic Information System (GIS) track file of the survey flights. A Project Aviation Safety Plan was completed and distributed to Oregon Coast National Wildlife Refuge Complex (OCNWRC) personnel prior to the survey. Consistent with OCNWRC policy, flight following was used throughout the flight. Contact between the flight crew and OCNWRC headquarters occurred at each departure and arrival point. All field notes and observations were recorded on hardcopy maps. The hardcopy maps of the survey are filed at OCNWRC in Newport, Oregon.

From each aerial survey, we used digital photographs with the highest resolution and most complete coverage of the colonies. Adobe Photoshop or Microsoft Powerpoint was used to "stitch" photographs together to provide a complete view of each colony. All active nest sites in the digital photographs were identified and assigned unique nest numbers with the aid of ArcMap GIS software (USFWS 2010). For each survey we identified the status of each nest site and used the following codes after Weigand and McChesney (2008):

First Code: Bird Activity

D = Adult standing at nest
S = Adult sitting on nest
T = Adult bird(s) on territory with little or no nest material
V = Vacant site

Second Code: Nest Site Condition

F = Fairly well-built nest
O = No nest material
P = Poorly-built nest
W = Well-built nest

Third Code: Nest Site Contents

C = Chick(s) visible in nest
E = Empty nest
G = Egg(s) visible in nest
U = Undetermined

Other Codes:

FAILED = First survey when nest discovered to be failed (nest/contents missing)
N/V = Nest site not visible - obstructed view

"Active nests" were defined as well-built or fairly well-built nests with an adult sitting on or standing at a nest. A fairly well-built nest is defined as: a well-defined, roughly circular pile of nesting material up to approximately 15 cm in height, with some evidence of a nest bowl depression at its center. A well-built nest is defined as: substantial (>15 cm vertical height) amount of nesting material, forming a clearly-defined circular nest structure with a well-developed nest bowl, often plastered with much guano (McChesney et al. 2007). "Territorial sites" had one of three characteristics: 1. adults standing or sitting at a potential nest site with little or no nesting material; 2. adults on a poorly-built nest, defined as a disorganized mound or a flat pile of nesting material; 3. adults sitting, standing, or absent at a well-built or fairly well-built nest that was visibly empty or an active nest that failed recently. From these data, a history of each nest site was established, including seasonal site status (breeding or territorial), approximate breeding phenology, and whether or not the nest failed during the survey period. Breeding sites were those with confirmed eggs or chicks or where breeding was inferred by nest status. Territorial sites were those occupied sites where breeding could not be confirmed or inferred by nest status. A failed nest is defined as nest or nest contents (eggs or chicks) destroyed or missing.

Night-time Video and Still-frame Photography

The objective of the photographic survey component was to obtain photo-documentation of the level of disturbance fireworks cause to the behavior of surface-nesting seabirds. Photographs capture details of bird behavior that often cannot be easily described and recorded within field notes. In addition, photographs provide undisputable evidence required to support disturbance or non-disturbance claims.

For comparison, photographs and video were taken at each treatment site on a quiet evening before the scheduled fireworks, and again on the evening of the fireworks. On 01 and 04 July 2011 at the Coquille Point Seabird Colony Complex, one volunteer professional photographer/videographer and two USFWS Wildlife Biologists recorded time-lapse still-frame digital images of North Coquille Point Rock's common murre and Brandt's cormorant colonies. Digital visible light still-frame photographs were taken with a Canon 5D Mark II DSLR camera using a Canon TC-80N3 Remote Controller Timer with Canon Ultrasonic Image Stabilizer 100-400 mm lens and 1.4X teleconverter (photographs taken at 560 mm). Night time-lapse photography was additionally collected at the Pirate Cove Rock Brandt's cormorant colony on 02 and 03 July 2011 by two USFWS Wildlife Biologists using the same equipment as described above. Still-frame photographs were recorded every twelve seconds at five frames per minute.

Concurrent with night-time still-frame photo-monitoring, the Table Rock double-crested cormorant and Pirate Cove Rock Brandt's cormorant colonies were continuously video recorded from the same mainland vantage point during the evenings (approximately 2130 to 2230 hrs) prior and during the fireworks displays. The seabird colonies were videoed using a Canon D60 DSLR camera (Full High-Definition Video; 1920 X 1080 pixel) with an Astroscope Pinnacle Central Intensifier Unit (Standard 9350 CIU; Manufactured by Sofradir-EC), Canon 600 mm lens and 2X teleconverter (video taken at 1200 mm; 38.4X magnification; Table Rock colony) or Canon Ultrasonic Image Stabilizer 100 – 400 mm lens (video taken at 560 mm; 12.8 magnification, Pirate Cove Rock colony).

Photographs and videos were viewed on a computer in the office and interpreted by a USFWS Wildlife Biologist. Upon video viewing, seabird species were identified, bird behaviors noted, and the number of birds that flushed from the monitored sites during the fireworks display was counted. All digital photographs and videos are archived at the Refuge's Newport office for future reference.

Night-time Sound Recording

The objective of the sound recording survey component was to record sound levels associated with fireworks display and link noise level recordings to video images. Sound levels can also be compared to the type of firework ignited and ultimately the reactions of the birds to a specific sound or sound level.

Recording equipment was positioned approximately 75 m from Pirate Cove Rock (near WorldMark by Wyndham® Timeshare Property, Depoe Bay) and on a bluff, approximately 400 m from Table Rock (Coquille Point Seabird Colony Complex, Bandon). The sound recording equipment was positioned at approximately the same locations as the land-based observation locations (Figures 3 and 4). The location of the sound monitoring equipment was approximately 1.21 and 1.72 km from the fireworks launch site at Pirate Cove Rock and Bandon respectively. Both recording locations were at the same approximate elevation as the colony, and the same approximate distance as the colonies (Pirate Cove Rock and Table Rock) to the fireworks display.

Sound levels were measured in decibels (dB) using a Quest Model 2400 Sound Level Meter (range: 30 -140 dB; accuracy: +/- 0.5 dB at 25^{o}C) mounted on a camera tripod. The electrical signal from the sound meter was sent by cable to a DataQ DI-158 data interface attached to a laptop computer. Software provided with the DI-158 (WinDaq Hardware Manager and WinDaq Waveform Browser) recorded 240 data points per second and displayed the signal in real time. The sound meter was calibrated using a 114 dB Quest sound generator before and after each recording session.

Ambient sound levels were recorded at each location for approximately 1 hour before the fireworks began. Recording continued throughout the entire fireworks display and ended approximately 10 minutes after the last recorded pyrotechnic. Sound level recordings were also measured prior to the fireworks display on 01 and 02 July at Coquille Point and Depoe Bay respectively to obtain baseline (non-fireworks display) ambient sound level data.

Data Analyses

The raw data were placed on Microsoft Office Excel spreadsheets and summary statistics were derived using descriptive statistics analysis functions within Excel.

RESULTS

Seabird Counts From Mainland Vantage Points

Pirate Cove Rock

Brandt's cormorant, pelagic cormorant, western gull, pigeon guillemot, and black oystercatcher nested on Pirate Cove Rock and were counted. Appendix 1 graphs summarize seabird count data by species, vantage point, and count time at Pirate Cove Rock. On 06 July high winds, heavy fog, and rain induced poor viewing conditions, therefore, birds were barely visible and counts could not be conducted at 0700 and 1300 hrs from the south observation location. On 01 and 04 July at 1300 hrs no counts were conducted from the south observation location. On 04 July at 1300 hrs, 06 July at 0700 hrs, and 09 July no counts were conducted from the east observation location. No birds were present if data bars are absent in the graphs at any other date and time.

Brandt's Cormorant

Approximately 62% (n = 118 of 189 nests) of the Brandt's cormorant colony was visible from the south vantage point, with 12% (n = 23 of 189 nests) visible from the east vantage point. However since observations were conducted from two vantage points, a large portion of the colony area was counted and overall bird abundance or presence was well detected. Brandt's cormorants were typically more numerous during the two earlier daily count periods (0700 and 0900 hrs). The count of birds remained fairly consistent and no trend was discernible, however, more birds were present at the beginning (27 June) and end (08 and 09 July) of the core monitoring period (Appendix 1). A peak count of 350 birds was recorded

on 08 July at 0700 hrs from the south vantage point. The large counts documented on 08 and 09 July were most likely due to increased numbers of non-breeding or failed breeding birds.

Pelagic Cormorant

Pelagic cormorants nested on the south cliff face of Pirate Cove Rock and only the observer on the south vantage point observed and counted this species. Breeding and non-breeding birds congregated on the ledges along the south side of the rock. Bird counts varied between count times and days, however, no trend in counts was evident during the monitoring period. A peak count of 52 individuals on 27 June and a minimum count of 10 on 05 July was documented (Appendix 1). More birds were observed at the beginning and end of the monitoring period when compared to middle. Fewer birds were present on 01 to 05 July.

Western Gull

Most western gulls nested on the north and east side of Pirate Cove Rock, separated from the Brandt's and pelagic cormorants. However, a few adult gulls were consistently observed in close proximity to cormorant nests apparently waiting for predatory opportunities. The gulls were easily viewed from the east vantage point and counts remained consistent throughout the monitoring period with no apparent trends. The number of birds counted from the east vantage point ranged from 137 to 221 individuals. In comparison, 56 to 114 individuals were counted from the north vantage point (Appendix 1).

Pigeon Guillemot

Only the south vantage point observer documented pigeon guillemots resting on ledges and water, as well as entering crevices where the bird behaviors indicated they were nesting. Most counts resulted in zero birds, however, a maximum count of 13 birds was documented on 04 July at 0700 hrs (Appendix 1). Bird presence and numbers were sporadic and no trends were noted.

Black Oystercatcher

Two black oystercatcher pairs were observed during the monitoring period and only one nest was detected on the northeast side of Pirate Cove Rock. Counts ranged from zero to four individuals and birds were counted only by the observer from the east vantage point (Appendix 1). One pair attended the single nest until 15 July. On 15 July, only one black oystercatcher was observed at 0700 hrs picking up pebbles and was not attending the nest. The egg or chick could not be found by the observer and the nest site was empty.

<u>Yaquina Head Seabird Colony Complex</u>

Brandt's cormorant, pelagic cormorant, western gull, pigeon guillemot, black oystercatcher, and common murre nested at the Yaquina Head Seabird Colony Complex and were counted (except common murre). Appendix 2 displays graphs of seabird count data by species and count time at Yaquina Head Seabird Colony Complex.

Brandt's Cormorant

The count of Brandt's cormorant remained very consistent and no trend was discernible, however, more birds were present at the beginning and end compared to the middle of the core monitoring period (Appendix 2). The Brandt's cormorant count ranged from 105 to 304 recorded on 02 July and 28 June respectively. The maximum count of 304 birds included large groups of roosting birds located on wash rocks near the nesting areas. The number of birds counted during the early count periods, 0700 and 0900 hrs, was almost always greater than the numbers counted at 1100 and 1300 hrs. This same trend was noted at Pirate Cove Rock.

Pelagic Cormorant

Very few pelagic cormorants were present at Yaquina Head Seabird Colony Complex. Counts ranged from 8 to 18 individual birds with the maximum count recorded on 27 June. Bird counts varied between count times and days, however, no trend was evident during the monitoring period (Appendix 2). The most consistent count with the least amount of variability occurred during the counts at 1300 hrs with a range of 9 to 13 birds.

Western Gull

Western gull nested throughout the colony complex in low numbers, with only seven nests documented. The bird counts ranged from 12 to 67, suggesting most of the birds were non-breeding individuals. Western gull were easily detected from the vantage point and counts remained consistent throughout the monitoring period with no distinguishable trends or high variability (Appendix 2).

Pigeon Guillemot

The highest pigeon guillemot counts occurred during the first two count periods each day (Appendix 2). Counts ranged from 0 to 58 birds. High counts of 54 and 58 birds occurred on 08 July, the next closest count was 24 birds.

Coquille Point Seabird Colony Complex

The area monitored at the Coquille Point Seabird Colony Complex included Table Rock, North Coquille Point Rock, and Middle Coquille Point Rock and counts at these three sites were combined and totaled for each survey hour. Brandt's cormorant, pelagic cormorant, double-crested cormorant, western gull, and pigeon guillemot, nested at Coquille Point Seabird Colony Complex and were counted. Black oystercatchers were also counted, however nesting was not confirmed. Appendix 3 displays graphs of seabird count data by species and count time at Coquille Point Seabird Colony Complex. On 06 and 07 July at 1100 and 0900 hrs respectively, heavy fog induced poor viewing conditions and counts could not be conducted. Double-crested cormorants on Table Rock were not counted on 29 June at 1300 hrs because of observer distractions.

Brandt's Cormorant

Brandt's cormorants nested on North and Middle Coquille Point Rocks and were usually not present on Table Rock. The number of Brandt's cormorants increased as the breeding season progressed with a noticeable increase documented from 05 to 10 July (Appendix 3). The Brandt's cormorant count ranged from 19 to 181 recorded on 28 and 29 June respectively. The minimum count of 19 individual birds is misleading because most of the area could not be counted due to fog and poor visibility. The maximum count of 181 birds included a large transient flock (105) of roosting birds located on Table Rock. The number of birds counted throughout the day varied slightly and birds were not more abundant at any particular time of the day.

Pelagic Cormorant

Pelagic cormorants nested on the east face of Table Rock cliffs and may have nested on other parts of the rock, but were not visible to the observer. Only an occasional bird was observed and counted on North and Middle Coquille Point Rocks. The number of pelagic cormorants increased as the breeding season progressed with a noticeable increase from 05 to 10 July (Appendix 3). A peak count of 34 individuals on 09 July and a minimum count of two on 29 June was documented. The minimum count of two birds does not reflect the actual number of birds present since Table Rock was not counted because of observer distractions. Birds were more abundant during the 0700 hr count compared to other count periods.

Double-crested Cormorant

Double-crested cormorants nested only on Table Rock and only an occasional bird was counted on Middle and North Coquille Point Rocks. In addition, only a small proportion of the Table Rock double-crested cormorant colony is visible from the mainland. The number of double-crested cormorants remained fairly stable prior to 05 July and increased after that date (Appendix 3). Large fledglings may have been included in the latter counts. A minimum count of 77 was recorded on 28 June and a maximum count of 213 on 09 July. The number of birds counted throughout the day remained consistent and birds were not more abundant at any particular time of the day.

Western Gull

Approximately 50-70% (range of 101 to 251) of western gulls counted were observed on Table Rock. North Coquille Point Rock gull counts ranged from 6 to 36, but were consistently in the teens. The number of birds counted ranged from 138 to 368 individuals. Counts remained consistent throughout the monitoring period with no distinguishable trends or high variability (Appendix 3). This species' count fluctuated only slightly and was the most consistent of all species monitored.

Pigeon Guillemot

Pigeon guillemots were observed most frequently on the water near Table Rock and North Coquille Point Rock with only an occasional bird sighted at Middle Coquille Point Rock. The highest pigeon guillemot counts occurred during the first two count periods each day (Appendix 3). Counts ranged from 0 to 34 birds. The count data varied slightly, but exhibited no trend.

Black Oystercatcher

One to four black oystercatchers were observed consistently within the Coquille Point Seabird Colony Complex. The observer indicated hearing birds on many occasions; however, no birds are recorded in the count tally. Breeding was not documented at this site for this species.

Gregory Point Seabird Colony Complex

Birds were counted on Chiefs Island and the nearby reef and counts of the two monitored sites were combined and totaled for each survey hour. Appendix 4 displays graphs of seabird count data by species and count time at Gregory Point Seabird Colony Complex. Brandt's cormorant, pelagic cormorant, double-crested cormorant, western gull, and pigeon guillemot, nested at Gregory Point Seabird Colony Complex and were counted. Black oystercatchers were also counted, however nesting was not confirmed. Counts were not conducted on 09 July at 0700 hrs, 07 July at 0700 and 0900 hrs, and 06 July because of heavy fog that induced poor viewing conditions. No birds were present if data bars are absent in the graphs at any other date and time.

Brandt's Cormorant

More Brandt's cormorants were consistently counted during the 0700 hrs count period, as it was the highest count of the day with the exception of two counts (Appendix 4). Bird presence and numbers were sporadic and no trends were noted. A peak count of 253 individuals on 08 July and a minimum count of 6 on 01 July was documented.

Pelagic Cormorant

Very few pelagic cormorant nest sites were visible from the observation point at Gregory Point. Counts ranged from 0 to 21 individual birds with the maximum count recorded on 01 July. Bird counts varied between count times and days, however, no trend in counts was evident during the monitoring period (Appendix 4).

Double-crested Cormorant

The number of double-crested cormorants remained stable throughout the monitoring period with the exception of 04 and 05 July. The number of birds counted increased substantially (4–6 times the average) and then returned to consistent levels during the remainder of the

monitoring period (Appendix 4). A minimum count of 9 was recorded on 28 June and 09 July and a maximum count of 65 on 05 July.

Western Gull

Numbers of western gull were variable throughout the monitoring period and exhibited no trend (Appendix 4). The number of birds counted ranged from 44 on 05 July to 100 individuals on 03 July. The number of birds was similar among the 4 times of the day surveyed.

Pigeon Guillemot

The highest pigeon guillemot counts occurred during the first two count periods each day (Appendix 4). Counts ranged from 2 to 41 birds recorded on 01 and 08 July respectively.

Black Oystercatcher

One to four black oystercatchers were observed consistently at Gregory Point. The observer indicated hearing birds on many occasions; however, breeding was not documented for this species.

Seabird Nest Monitoring From Mainland Vantage Points

Pirate Cove Rock

Brandt's Cormorant

During the core monitoring period, 118 individual Brandt's cormorant nest sites were observed at Pirate Cove Rock from the south vantage point. Of these 118 nests, 77 had sustained bird activity of incubating or brooding posture or sustained incubating posture during the core study period (Appendix 5). As a result, 65% of all observed Brandt's cormorant pairs exhibited behavior typical of breeding birds, although the presence and/or number of chicks were never determined for these 77 nests. These nests were observed on an average of 10.6 days throughout the core monitoring period (range: 1-14 days, SD: 2.01 days).

Of the 118 observed Brandt's cormorant nests, 32 nests were observed with eggs or chicks, or changed from an incubating posture to a brooding or bird with chick posture. This resulted in 27% of all nests where breeding was confirmed by either a change of egg to chick rearing posture or a visual confirmation of chick presence. Nests in this category were observed on an average of 9.6 days throughout the observed study period (range: 1-13 days, SD: 3.0 days).

Of the 118 observed Brandt's cormorant nests, 5 (or 4.2%) began with an adult bird in incubating posture and were later observed to have failed (nest or nest contents destroyed or missing) (Table 1, Appendix 5). One newly failed nest was documented on 03 July. On 04

July (the morning after the fireworks event), two nests were newly failed or 1.9% of the 03 July total active nests. One of these nests had nest material prior to 03 July, but did not have nest material on 04 July. Additional nests were documented as newly failed on 08 and 15 July. Daily failure rate on 03 July (before the fireworks event) was at 0.9% and the day after the fireworks event the rate was 1.9% (Table 1). Two nests failed several days after the fireworks event on 08 and 15 July, which are not attributed to fireworks disturbance. In summary, 2 of the 5 (40%) total failed Brandt's cormorant nests failed on 04 July, immediately after the fireworks display (Table 1).

Table 1. Brandt's cormorant nest and territorial site summary as determined from mainland south vantage point observations at Pirate Cove Rock 27 June to 15 July 2011.

Reproductive Stage	**27-Jun**	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**	**15-Jul**
Active Nests[A]	26	20	105	106	84	90	107	107	48	46	97	104	102	100
Territorial Sites[B]	2	2	5	5	3	5	5	7	4	3	7	7	6	9
Undetermined[C]	1	0	1	4	2	2	0	0	0	1	1	0	0	7
Total Sites:	**29**	**22**	**111**	**115**	**89**	**97**	**112**	**114**	**52**	**50**	**105**	**111**	**108**	**116**
Newly Failed Nests	0	0	0	0	0	0	1	2	0	0	0	1	0	1
Daily Failure Rate (%)	0	0	0	0	0	0	0.9	1.9	0	0	0.9	0.9	0	0.9

[A]Active Nests: Adult sitting or standing at fairly well-built or well-built nest sites.
[B]Territorial Sites: 1) Adults sitting or standing at site with little or no nest material; 2) adults on poorly built nests; 3) Adults sitting, standing, or absent at nest site with a visibly empty nest or an active nest that failed recently.
[C]Undetermined: Multiple nest site or bird activity parameters undetermined.

Pelagic Cormorant

Twelve nests were monitored on the south side of Pirate Cove Rock from 29 June to 15 July (Appendix 6). Nine of the twelve nests had adults in incubating posture throughout the monitoring period and eggs were confirmed in five of the nine nests. One of the twelve nest sites appeared to be just a territorial site because the nest was poorly built and contained no eggs. Two nests appeared to have failed after the fireworks event (one each day on 04 and 15 July). One nest (one of eleven or 9% nest failure rate) that failed on 04 July may have been a result of fireworks disturbance because it was active on 03 July.

Western Gull

During data analysis, gull nest data collected at Pirate Cove Rock were deemed to be highly variable due to observer error (inconsistent use of gull monitoring protocol) and gull chick mobility (highly precocial) making nest occupancy, success, and failure undeterminable. The gull nest data were not included during analysis because of the previously mentioned reasons.

Black Oystercatcher

One black oystercatcher nest was located several meters above high tide line on the northeast side of Pirate Cove Rock and one egg was observed in the nest bowl on 30 June. On 15 July, only one adult was observed the entire day and the nest/egg could not be found. The observer concluded the nest was abandoned and the egg or chick depredated.

Yaquina Head Seabird Colony Complex

Brandt's Cormorant

Seventy-one Brandt's cormorant nests were monitored at Yaquina Head Seabird Colony Complex from 27 June to 09 July by two observers (Appendix 7, Table 2). Brandt's cormorants at this reference site experienced 11% nest failure (n= 8 nests). The nest failures occurred throughout the core monitoring period, 7 of the 8 total nests failed on or after 02 July (4 nests failed on 02 July). Daily failure rate was 1.4%, 5.6%, 1.4%, and 2.8% on 28 June, 02 July, 04 July, and 08 July respectively (Table 2). Breeding status was confirmed at 69 nests (97%) because eggs or chicks were observed at the nest sites during the monitoring period. At the start of the monitoring effort (27 June) chicks were observed in 32% (n = 23 of 71 nests) of the nests. Two birds initiated egg laying late in the monitoring period. Eggs were documented in the two nests on 08 and 09 July.

Table 2. Brandt's cormorant nest summary as determined from mainland vantage point observations at Yaquina Head Seabird Colony Complex (reference site) 27 June to 09 July 2011.

Reproductive Stage[A]	**27-Jun**	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**
Active Nests	71	70	70	70	70	66	66	65	65	65	65	63	63
Territorial Sites	0	1	1	1	1	5	5	6	6	6	6	8	8
Undetermined	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Sites:	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**
Newly Failed Nests	0	1	0	0	0	4	0	1	0	0	0	2	0
Daily Failure Rate (%)	0	1.4	0	0	0	5.6	0	1.4	0	0	0	2.8	0

[A]See Table 1 footnotes for reproductive stage descriptions

Pelagic Cormorant

Nine pelagic cormorant nests were located at Yaquina Head Seabird Colony Complex and monitored from 27 June to 09 July (Appendix 8). Pelagic cormorants experienced 22% (n = 2 of 9 total nests) nest failure. Nest failures were first observed on 28 June and 02 July, similar to Brandt's cormorants. Daily failure rate was 11.1% (n = 1 nest) on 28 June and 02 July (Table 3). No chicks were observed during the monitoring period. Number of eggs observed per nest ranged from 1 to 3, with a mean of 2.25 eggs per nest. Breeding was confirmed by the observation of egg(s) at least once at each nest site during the core monitoring period.

Table 3. Pelagic cormorant nest summary as determined from mainland vantage point observations at Yaquina Head Seabird Colony Complex (reference site) 27 June to 09 July 2011.

Reproductive Stage[A]	**27-Jun**	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**
Active Nests	9	8	8	8	8	7	7	7	7	7	7	7	7
Territorial Sites	0	1	1	1	1	2	2	2	2	2	2	2	2
Undetermined	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Sites:	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**
Newly Failed Nests	0	1	0	0	0	1	0	0	0	0	0	0	0
Daily Failure Rate (%)	0	11.1	0	0	0	11.1	0	0	0	0	0	0	0

[A]See Table 1 footnotes for reproductive stage descriptions

Western Gull

Seven western gull nests were monitored at this reference site (Appendix 9). Western gulls experienced 29% (n = 2 of 7 total nests) nest failure or 71% success rate. Chicks were observed at all nests except in one that failed. Nest failures were first observed on 01 and 03 July with daily failure rate at 14.3% (n = 1 nest) each of those two days (Table 4).

Table 4. Western gull nest summary as determined from mainland vantage point observations at Yaquina Head Seabird Colony Complex (reference site) 27 June to 09 July 2011.

Reproductive Stage[A]	**27-Jun**	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**
Active Nests	6	6	7	7	6	6	5	5	5	5	5	5	5
Territorial Sites	0	0	0	0	1	1	2	2	2	2	2	2	2
Undetermined	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Sites:	**6**	**6**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Newly Failed Nests	0	0	0	0	1	0	1	0	0	0	0	0	0
Daily Failure Rate (%)	0	0	0	0	14.3	0	14.3	0	0	0	0	0	0

[A]See Table 1 footnotes for reproductive stage descriptions

<u>Coquille Point Seabird Colony Complex</u>

Brandt's Cormorant

Twenty-two Brandt's cormorant nests were monitored at North Coquille Point Rock from 28 June to 10 July by one observer (Appendix 10). Brandt's cormorants at this treatment site experienced 4.5% nest failure (n = 1 nest) (Table 5). The nest failure occurred on 03 July, prior to the fireworks display. The single failed nest was well-built early in the monitoring period and was a poor built nest by 03 July. The attending adults departed the area and one was observed only two times after the failure. Breeding status was confirmed at 13 nests (59%) because chicks were observed at the nest sites at some point during the core monitoring period.

Table 5. Brandt's cormorant nest summary as determined from mainland vantage point observations at North Coquille Point Rock 28 June to 10 July 2011.

Reproductive Stage[A]	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**	**10-Jul**
Active Nests	20	18	20	22	22	21	21	21	21	20	21	21	21
Territorial Sites	0	0	0	0	0	1	1	1	1	1	1	1	1
Undetermined	2	4	2	0	0	0	0	0	0	1	0	0	0
Total Sites:	**22**	**22**	**22**	**22**	**22**	**22**	**22**	**22**	**22**	**22**	**22**	**22**	**22**
Newly Failed Nests	0	0	0	0	0	1	0	0	0	0	0	0	0
Daily Failure Rate (%)	0	0	0	0	0	4.5	0	0	0	0	0	0	0

[A]See Table 1 footnotes for reproductive stage descriptions

Pelagic Cormorant

Ten pelagic cormorant nest sites were monitored from 28 June to 10 July (Appendix 11). Eight nests were located on the east cliff face of Table Rock and two on North Coquille Point Rock. Two of the ten total nests had adults in incubating posture throughout the monitoring period and eggs or chicks were confirmed in three nests. Three of the ten nest sites appeared to be territorial sites as the nests were poorly built and contained no eggs. Pelagic cormorants experienced 43% nest failure (n = 3 of 7 total nests). The three nests failed before the fireworks event (one on 01 and two on 02 July). Daily nest failure rates were 10% (n = 1 nest) and 20% (n = 2 nests) on 01 and 02 July respectively (Table 6).

Table 6. Pelagic cormorant nest summary as determined from mainland vantage point observations at Table Rock and North Coquille Point Rock 28 June to 10 July 2011.

Reproductive Stage[A]	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**	**10-Jul**
Active Nests	9	9	9	9	7	7	7	7	7	7	7	7	7
Territorial Sites	0	0	0	1	3	3	3	3	3	3	3	3	3
Undetermined	1	1	1	0	0	0	0	0	0	0	0	0	0
Total Sites:	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
Newly Failed Nests	0	0	0	1	2	0	0	0	0	0	0	0	0
Daily Failure Rate (%)	0	0	0	10	20	0	0	0	0	0	0	0	0

[A]See Table 1 footnotes for reproductive stage descriptions

Double-crested Cormorant

Seven double-crested cormorant nests were monitored at Table Rock (Appendix 12). Breeding status was confirmed at all seven nests since chicks were observed at the nest sites at some point during the monitoring period. No nest failure was observed of the nests monitored (Table 7). Five of the seven nests contained chicks by 28 June, the first day of observations. By the end of the monitoring period, some chicks were large and mobile, therefore, it was difficult to distinguish nest origin of mobile chicks and chick mortality could not be determined. No nest failure or chick fatalities were recorded or observed during the monitoring period.

Table 7. Double-crested cormorant nest summary as determined from mainland vantage point observations at Table Rock 28 June to 10 July 2011.

Reproductive Stage[A]	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**	**10-Jul**
Active Nests	7	7	6	7	7	7	6	6	6	6	6	6	7
Territorial Sites	0	0	0	0	0	0	0	0	0	0	0	0	0
Undetermined	0	0	1	0	0	0	1	1	1	1	1	1	0
Total Sites:	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Newly Failed Nests	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Failure Rate (%)	0	0	0	0	0	0	0	0	0	0	0	0	0

[A]See Table 1 footnotes for reproductive stage descriptions

Western Gull

Western gulls nested on all of the islands/rocks associated with Coquille Point Seabird Colony Complex, however, we monitored a sub-set of 21 nests on Table Rock (Appendix 13). Breeding status was confirmed at 20 of 21 nests (95%) since chicks were observed at the nest sites at some point during the monitoring period. By the end of the monitoring period, some chicks were large and mobile, therefore, it was difficult to distinguish nest origin of mobile chicks and chick mortality was difficult to determine. Western gulls experienced 4.8% (n = 1 nest) nest failure (Table 8) on 05 July.

Table 8. Western gull nest summary as determined from mainland vantage point observations at Table Rock 28 June to 10 July 2011.

Reproductive Stage[A]	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**	**10-Jul**
Active Nests	21	20	21	21	21	21	21	20	20	20	20	19	20
Territorial Sites	0	0	0	0	0	0	0	1	1	1	1	1	1
Undetermined	0	1	0	0	0	0	0	0	0	0	0	1	0
Total Sites:	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**
Newly Failed Nests	0	0	0	0	0	0	0	1	0	0	0	0	0
Daily Failure Rate (%)	0	0	0	0	0	0	0	4.8	0	0	0	0	0

[A]See Table 1 footnotes for reproductive stage descriptions

<u>Gregory Point Seabird Colony Complex</u>

Brandt's Cormorant

Seven Brandt's cormorant nests were monitored at Chiefs Island from 28 June to 10 July (Appendix 14, Table 9). This species experienced no nest failure since abandonment of the nests monitored was not detected. Breeding status was confirmed at only one nest, where a chick was observed on 10 July. Adult birds attended all nests throughout the monitoring period. Asynchronous breeding phenology occurred since new nests were being constructed at other sites at the end of the monitoring period on 10 July.

Table 9. Brandt's cormorant nest summary as determined from mainland vantage point observations at Chiefs Island 28 June to 10 July 2011.

Reproductive Stage[A]	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**	**10-Jul**
Active Nests	4	5	7	7	6	7	7	7	0	7	7	7	7
Territorial Sites	0	0	0	0	0	0	0	0	0	0	0	0	0
Undetermined	3	2	0	0	1	0	0	0	7	0	0	0	0
Total Sites:	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Newly Failed Nests	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Failure Rate (%)	0	0	0	0	0	0	0	0	0	0	0	0	0

[A]See Table 1 footnotes for reproductive stage descriptions

Double-crested Cormorant

Nine double-crested cormorant nests were located in a branched Sitka spruce (*Picea sitchensis*) snag on Chiefs Island and monitored from 28 June to 10 July (Table 10, Appendix 15). Chicks were detected in all nests and breeding status was confirmed. This species experienced no nest failure at this site.

Table 10. Double-crested cormorant nest summary as determined from mainland vantage point observations at Chiefs Island 28 June to 10 July 2011.

Reproductive Stage[A]	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**	**10-Jul**
Active Nests	9	9	9	9	9	9	9	9	9	9	9	9	9
Territorial Sites	0	0	0	0	0	0	0	0	0	0	0	0	0
Undetermined	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Sites:	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**
Newly Failed Nests	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Failure Rate (%)	0	0	0	0	0	0	0	0	0	0	0	0	0

[A]See Table 1 footnotes for reproductive stage descriptions

Western Gull

Fourteen western gull nests were monitored at Chiefs Island and the adjacent reef colony from 28 June to 10 July (Appendix 16). Two nests were constructed but no eggs were observed during the monitoring period. Breeding status was confirmed at 11 of 14 nests (79%) as chicks were observed. By the end of the monitoring period, some chicks were large and mobile, therefore, it was difficult to distinguish nest origin of mobile chicks and chick mortality was difficult to determine. Western gulls experienced an overall 14% (n = 2 nest) nest failure, where one nest failed on 30 June and 04 July (daily failure rate at 7.1% each day) (Table 11).

Table 11. Western gull nest summary as determined from mainland vantage point observations at Chiefs Island and reef 28 June to 10 July 2011.

Reproductive Stage[A]	**28-Jun**	**29-Jun**	**30-Jun**	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**	**8-Jul**	**9-Jul**	**10-Jul**
Active Nests	12	13	12	12	10	12	11	12	0	11	12	12	12
Territorial Sites	0	0	1	1	1	1	2	2	2	2	2	2	2
Undetermined	2	1	1	1	3	1	1	0	14	1	0	0	0
Total Sites:	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**
Newly Failed Nests	0	0	1	0	0	0	1	0	0	0	0	0	0
Daily Failure Rate (%)	0	0	7.1	0	0	0	7.1	0	0	0	0	0	0

[A]See Table 1 footnotes for reproductive stage descriptions

Seabird Nest Monitoring Via Aerial Photography

Pirate Cove Rock

The Brandt's cormorant colony at Pirate Cove Rock was monitored and nest status was determined using aerial digital photographs. A total of 192 cormorant nest sites were identified from aerial photographs and assigned unique numbers (Figure 7). Territorial sites that were present on a single survey were not assigned nest numbers. The reproductive phenology and success of each nest site is shown in Appendix 17.

Of 192 sites followed, 189 were identified as breeding sites and three as territorial sites (*i.e.*, where egg-laying was not likely to have occurred). During the first aerial photographic survey on 01 June, 27 nests (14%) were recorded to be active (Table 12). Early June was the beginning of the Brandt's cormorant breeding season and most birds initiated nest building and started to lay or incubate eggs. Nest establishment continued to increase through June and peaked by early July. On 03 and 08 July, the status of two nests was undetermined due to rocks obstructing the view of the nest (Table 12, Appendix 17). Few chicks or eggs in nests were identified in the aerial photographs because of camera angle and photographic detail. The nest site contents were undetermined and only an adult bird in incubating posture was noted at most active nest sites (Appendix 17). By 02 September, 4 active nests with well-developed large chicks remained and most of the nesting area was abandoned by adults and fledglings. The data from the last survey suggest that no pairs that experienced nest failure in July re-nested successfully.

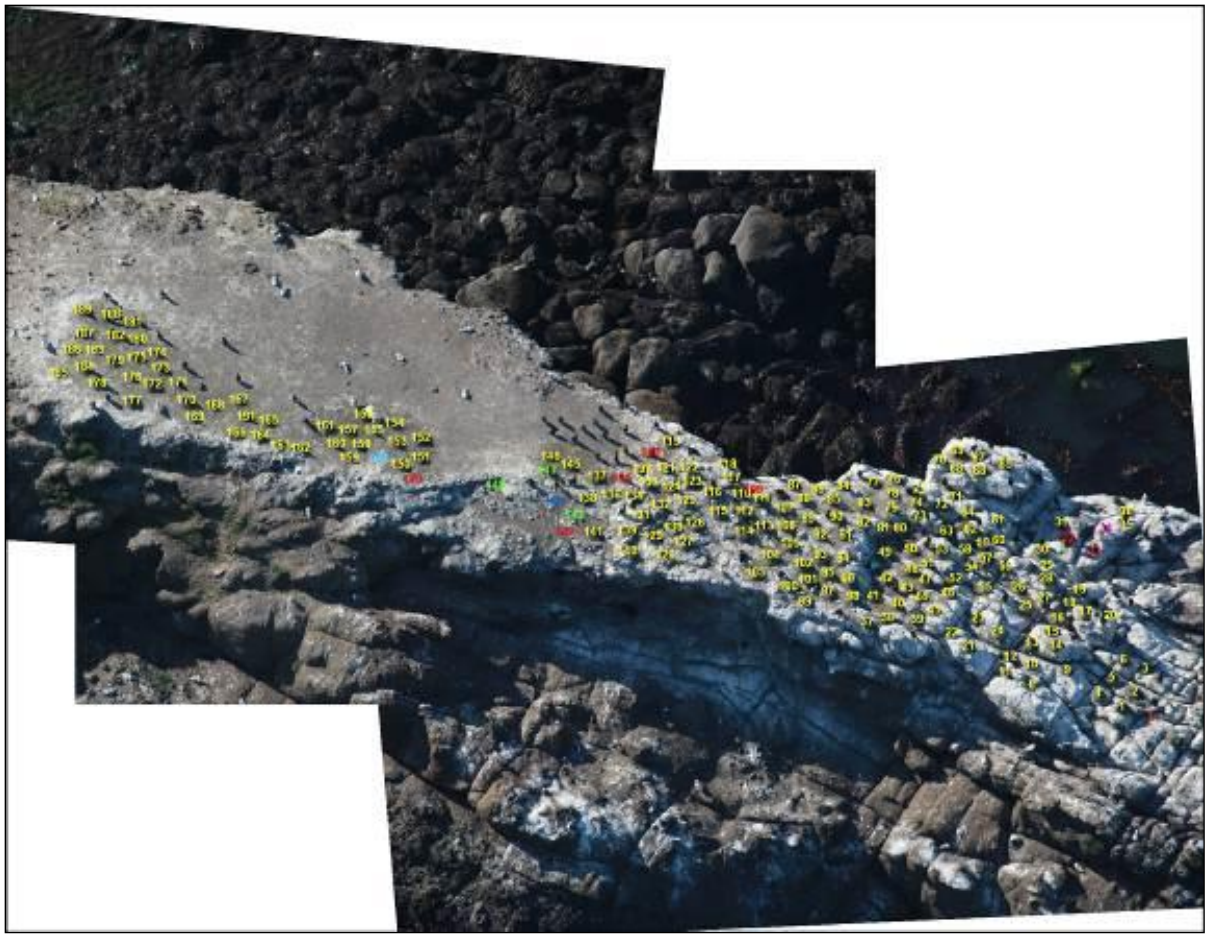


Figure 7. Aerial photograph of Pirate Cove Rock from the northwest, 05 July 2011 with Brandt's cormorant nests numbered. Nest site numbers are color coded: yellow – active nests; green – territorial sites; turquoise – nest newly failed 02 July; blue – nest newly failed 03 July; red – nest newly failed on 04 July; and pink – nest newly failed 05 July (Photo: Shawn W. Stephensen/USFWS).

Table 12. Brandt's cormorant nest and territorial site summary as determined from aerial photographs at Pirate Cove Rock 01 June to 02 September 2011.

Reproductive Stage	**1-Jun**	**9-Jun**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**8-Jul**	**2-Sep**
Active Nests[A]	27	66	184	183	179	178	177	4
Territorial Sites[B]	101	103	7	6	13	14	14	188
Undetermined[C]	0	0	0	2	0	0	1	0
Total Sites:	**128**	**169**	**191**	**191**	**192**	**192**	**192**	**192**
Newly Failed Nests	0	0	1	1	8	1	0	NA
Daily Failure Rate (%)	0%	0%	0.5%	0.5%	4.5%	0.5%	0%	NA

[A]See Table 1 for reproductive stage descriptions

Newly failed (nest or nest contents destroyed or missing) nests were documented on 02 and 03 July. On 04 July (the morning after the fireworks event), eight nests were newly failed or 4.4% (n = 8 of 183 total active nests) of the 03 July total active nests. An additional nest was documented as newly failed on 05 July. Daily failure rate on 02 and 03 July (before the fireworks event) was 0.5% (n = 1 of 184 total active nests) and the day after the fireworks event the rate increased to 4.5% (n = 8 of 179 total active nests) (Table 12). Within two days after the fireworks event, nine Brandt's cormorant nests or 4.8% (n = 9 of 189 season total active nests) failed. In summary, 9 of the 11 (82%) total failed nests failed within two days immediately after the fireworks display (Table 12).

Aerial photographs with close-up views of a section of the Brandt's cormorant colony before (Figure 8) and after (Figure 9) the fireworks display are provided below to show nest sites documented as nest failures. Figure 8, is an aerial photograph taken on 02 July, depicted active cormorant nests were fairly- or well-built with incubating adults prior to the fireworks display. The circled nests with nest number 144 failed on 03 July and 120, 135, and 142 failed on 04 July. Figure 9 is an aerial photograph that shows the same colony location on 04 July and depicts newly failed nests. At nest number 120 the adult cormorant stands at an empty nest. Additionally, nest material from previously well-developed nests is gone from nests 135, 142, and 144 and a new nest appears adjacent (right) to 135. Also, note the opportunistic predatory western gull (potentially looking for eggs/chicks) and non-incubating cormorants standing near nest 120 (Figure 9).

Figure 8. Aerial photograph of Pirate Cove Rock (partial) from the northwest, 02 July 2011 with Brandt's cormorant nests numbered that fail on 03 and 04 July (Photo: Shawn W. Stephensen/USFWS).

Figure 9. Aerial photograph of Pirate Cove Rock (partial) from the northwest, 04 July 2011 with Brandt's cormorant nests numbered that failed on 03 and 04 July. Note nest material and adult cormorants absent, opportunistic predatory western gull, and non-incubating cormorants present (Photo: Shawn W. Stephensen/USFWS).

Yaquina Head Seabird Colony Complex

Aerial photographic analysis of Yaquina Head Seabird Colony Complex (reference site) could not be completed because aerial photographs did not capture the entire Brandt's cormorant colony that was monitored from the mainland vantage point. This species nested at various locations within the colony complex and not all angles of each monitored nesting rock was photographed each day during the core monitoring period. Approximately 61% (n = 71 of 117 total nests) of the Brandt's cormorant nests on the various rocks monitored were observed from the mainland vantage point at Yaquina Head Seabird Colony Complex, which is a representative sample of the entire colony.

North Coquille Point Rock

Aerial photographs recorded 154, 156, 168, 170, 162, 168, and 0 Brandt's cormorant nests at North Coquille Point Rock on 01 June; 02, 03, 04, 05, 08 July; 02 September respectively (Figure 10). Due to camera angle during flights and difficulty of tracking individual nest sites during photographic analysis, nests were not aerial monitored beyond 04 July. The

apparent decline in active nests (n = 170 to 162 nests) recorded on 05 July was due to lack of photographic detail and visibility rather than an actual reduction in nest numbers. After 04 July the photographic angle of the seabird colony was more oblique and numerous common murres obscured the view of a number of cormorant nests. Since it was not possible to track individual nests on the aerial photographs consistently throughout the monitoring period, we could not determine if any nest losses coincided with the fireworks disturbance with this observational technique.

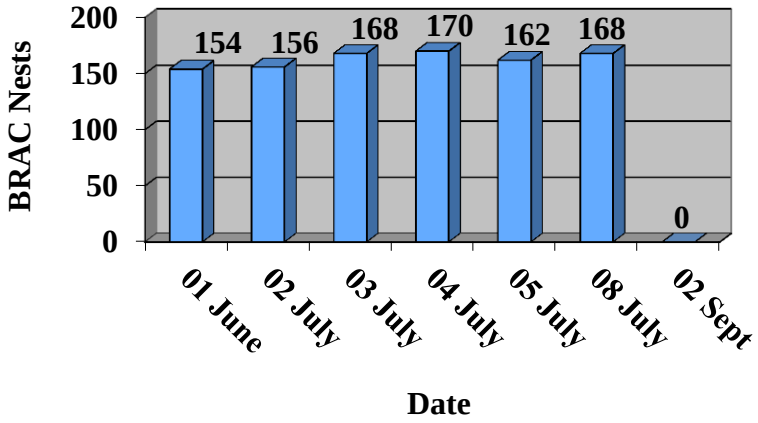


Figure 10. Number of active Brandt's cormorant (BRAC) nests detected in aerial photographs of North Coquille Point Rock during summer 2011.

Aerial photographs taken on 04 July (Figure 11) and 05 July (Figure 12) prior to and after the fireworks display respectively, show no Brandt's cormorant nest loss at the North Coquille Point Rock colony.

Figure 11. Aerial photograph of North Coquille Point Rock (partial) from the west, 04 July 2011 before the fireworks display (Photo: Shawn W. Stephensen/USFWS).

Figure 12. Aerial photograph of North Coquille Point Rock (partial) from the west, 05 July 2011 after the fireworks display (Photo: Shawn W. Stephensen/USFWS).

Gregory Point Seabird Colony Complex

Aerial photographic data analysis of the Brandt's cormorant colony from Gregory Point Seabird Colony Complex was not attempted because of inconsistent paired treatment-reference site comparisons. Since aerial photography was not used at Coquille Point Seabird Colony Complex to document Brandt's cormorant nest fate, proper comparison analysis of treatment and reference sites could not be completed.

Night-time Video and Still-frame Photography

Pirate Cove Rock

Night-time still-frame photographs (Figure 13) and continuous video recordings (Figure 14) of the Pirate Cove Rock Brandt's cormorant colony were recorded on 02 and 03 July from the same mainland vantage point. Images were recorded prior to (02 July) and during the fireworks display (03 July) and bird behavior was compared. Time-lapse photography provided approximately 90 minutes of images of colony activity during the same time on the two evenings.

Bird behavior recorded by both still and video images on 02 July, prior to the fireworks display, revealed no discernible ambient or physical disturbance that may have impacted the seabird colony. Normal quiet (i.e., no loud vocalizations) nest attendance, roosting, loafing,

and preening behaviors were noted. Adult birds (e.g., Brandt's cormorants, western gulls) attended their nests, incubated eggs, and cared for chicks in a calm manner. Birds not attending nests remained on the rock and displayed normal loafing or preening behavior (Figures 13 and 14).

Figure 13. Photograph of the Pirate Cove Rock Brandt's cormorant colony prior to the fireworks display at 2152 hrs 02 July 2011. Note the number of gulls (breeding and non-breeding) present and incubating position of the cormorants (Photo: David B. Ledig/USFWS).

Figure 14. Night-vision video frame image of the Pirate Cove Rock Brandt's cormorant colony prior to the fireworks display at 2132 hrs 03 July 2011 (Photo: David B. Ledig/USFWS).

Bird behavior of highly stressed and agitated birds recorded by both time-lapse photographs and video, on 03 July during the fireworks display, was a strong contrast from the calm behavior recorded the night before. On the evening of the fireworks display, birds first flushed from nests and roosting locations at 2130 hrs, when a loud salute/percussion firework was launched north of the colony. The birds settled down but flushed again at the start of the main Depoe Bay celebratory fireworks show at 2200 hrs. The cormorants and gulls behavior became visibly alert and numerous birds flushed from the colony rock immediately at the start of the fireworks display. Approximately 70 - 90 birds flushed and vocalized loudly as they circled Pirate Cove Rock. The birds remaining on the rock exhibited stressed behavior such as open beaks, gapping, head-bobbing, erect posturing, and loud vocalization during the length of the fireworks display (Figure 15). The attending birds on the breeding colony changed body postures from calm, relaxed, and resting to highly stressed and alert. Numerous birds relocated from their original locations to the edge of the rock in preparation for flight. Most nesting (incubating or brooding) cormorants did not depart from their nests, however, many stood up or they raised their heads and were alert and reacted with shutters/jerks to the individual fireworks explosions and flashes. Some loafing (non-breeding or attending adult not incubating/brooding) birds departed the colony to the south, away from the disturbance to the north, and then returned (landed) to the rock during the course of the display. The largest visible and sound disturbance occurred during the prolonged fireworks finale when many birds of all species took flight from the colony (Figure 16).

Still time-lapse photographs revealed differences in the number of gulls on the rock. More gulls were present on the rock prior to the fireworks display when compared to during the

display (Figures 13 and 15). Cormorants were standing and erect during the fireworks display, whereas before the display, they were in incubating posture. In addition, bright flashes of light were captured in the photographs during the fireworks display as seen in Figure 15.

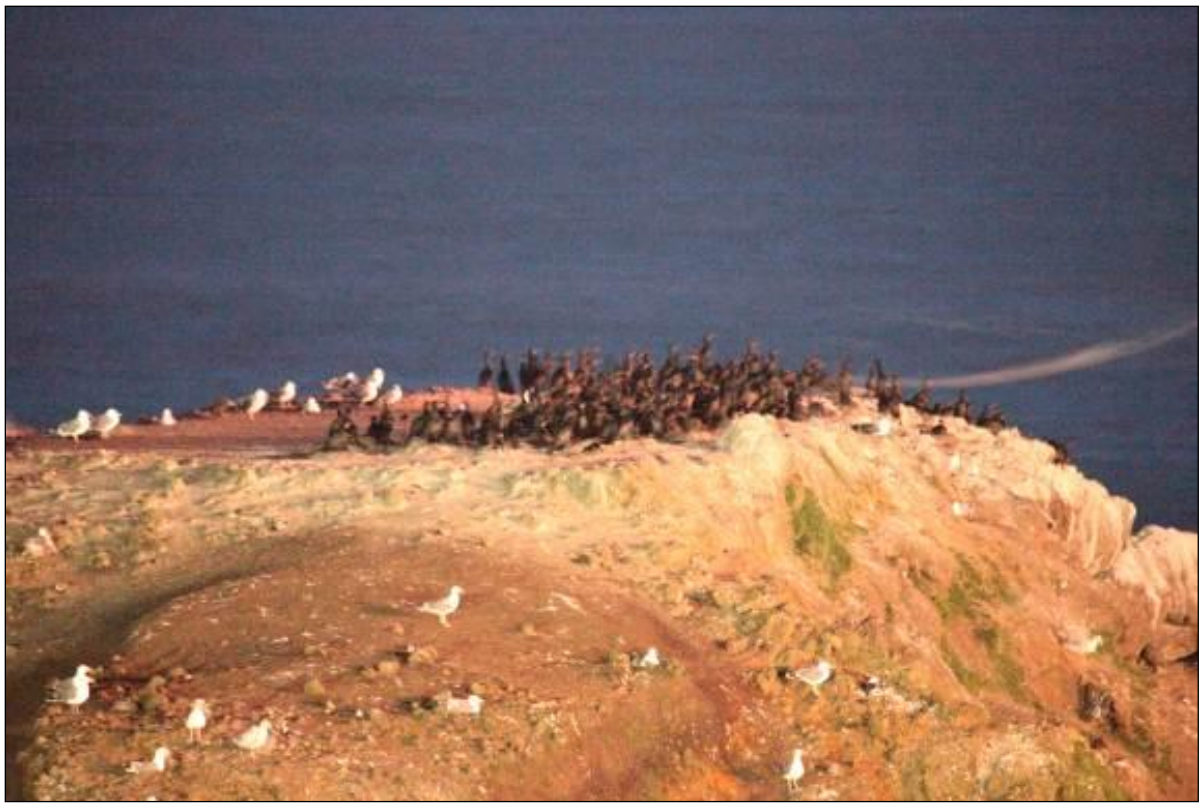


Figure 15. Photograph of the Pirate Cove Rock Brandt's cormorant colony illuminated during the fireworks finale at 2220 hrs 03 July 2011. Note birds standing and looking in the direction of the fireworks display (Photo: David B. Ledig/USFWS).

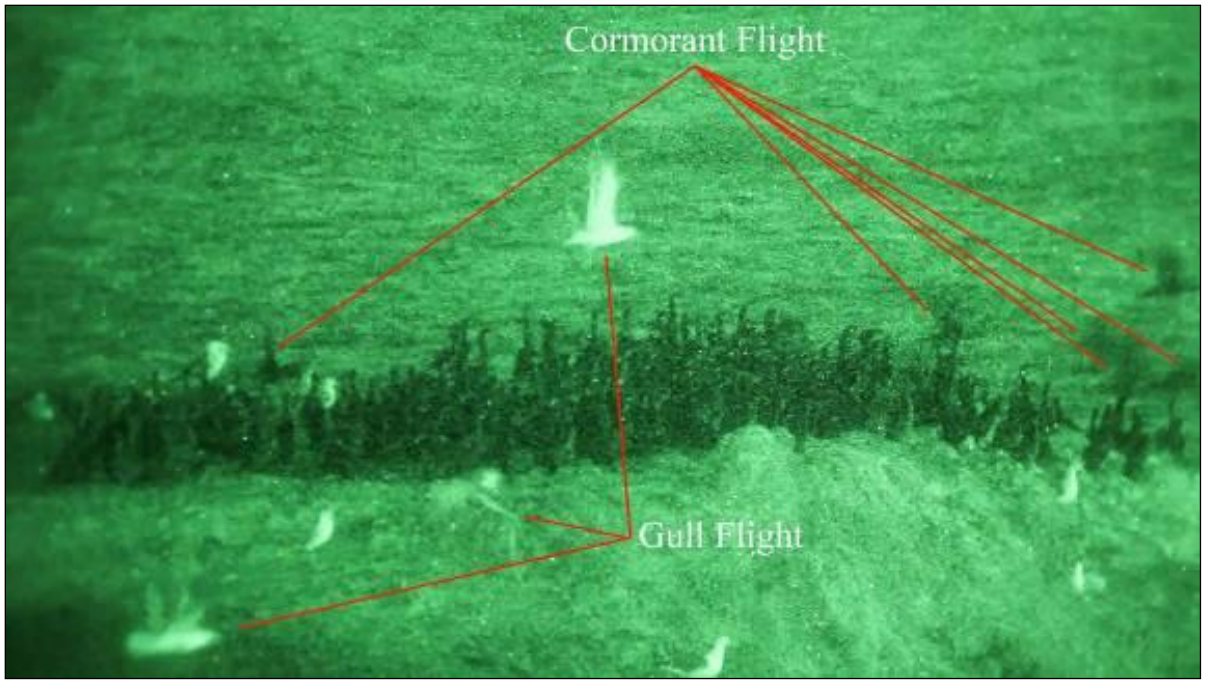


Figure 16. Night-vision video frame image of the Pirate Cove Rock Brandt's cormorant colony during the fireworks display finale at 2220 hrs 03 July 2011 (Photo: David B. Ledig/USFWS).

Coquille Point Seabird Colony Complex

Night-time still-frame time-lapse photographs of North Coquille Point Rock's common murre and Brandt's cormorant colony and continuous video recordings of Table Rock double-crested cormorant colony were recorded on 01 and 04 July from the same mainland vantage point. Images were recorded prior to (01 July) and during the fireworks display (04 July) and bird behavior compared. Time-lapse photography provided approximately 90 minutes of images of colony activity during the same time on two evenings.

Bird behavior recorded on 01 July, prior to the fireworks display, revealed no discernible ambient or physical disturbance. Adult birds of all species attended their nests and incubated eggs or cared for chicks in a calm manner. Birds not attending nests remained on the rock and calmly displayed normal loafing or preening behavior (Figure 17).

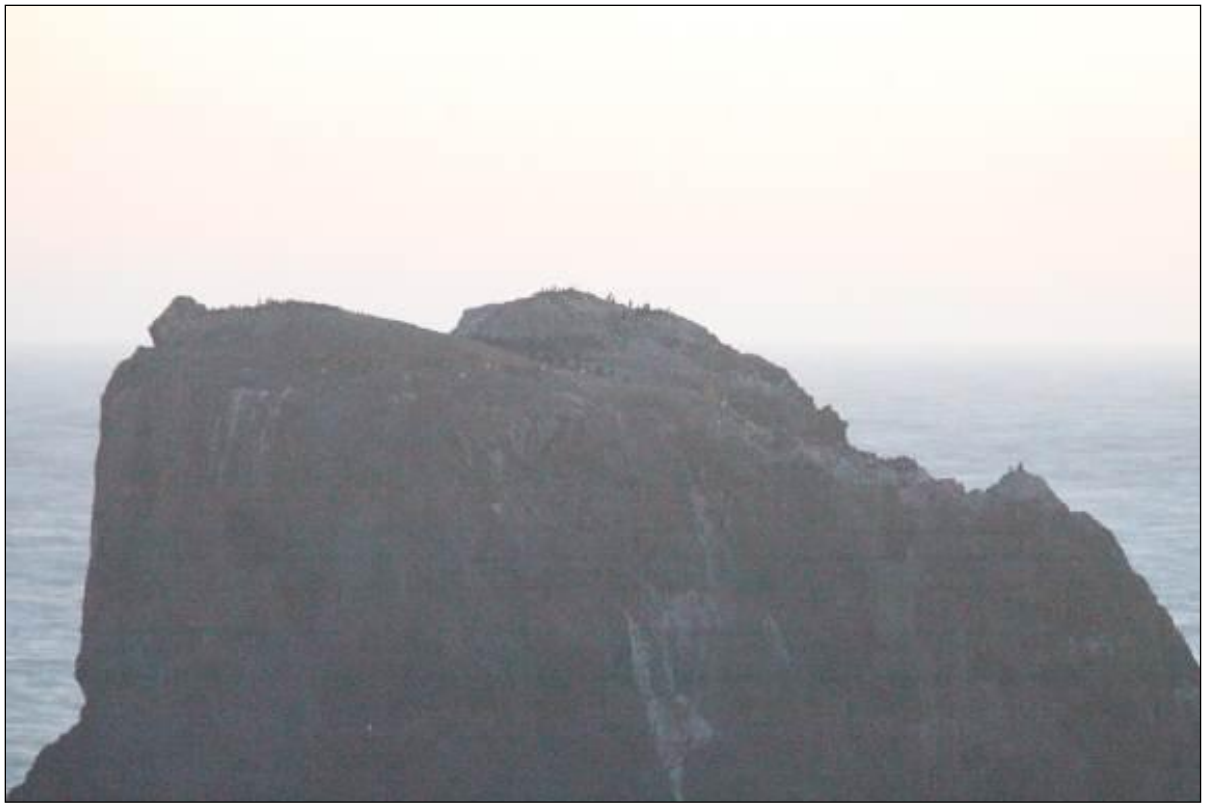


Figure 17. Photograph of the North Coquille Point Rock's common murre and Brandt's cormorant colony prior to the fireworks display at 2157 hrs 04 July 2011 (Photo: David B. Ledig/USFWS).

Bird behavior recorded by both time-lapse photography and video, on 04 July during the fireworks display, was slightly different compared to the behavior recorded in the images prior to the display. At the start of the city of Bandon celebratory fireworks display, the cormorants and common murres became visibly alert but did not flush. Some birds on the island exhibited increased stressed behavior such as head-bobbing and erect posturing during the course of the fireworks display (Figure 19). However, no birds were observed departing the colony and breeding adults remained on the nest and some birds (adult and young double-crested cormorants) tucked their heads or pulled on nesting material as a displacement behavior. In addition, fireworks detonation flashes of light were captured in the photographs during the fireworks display as seen in Figure 18.

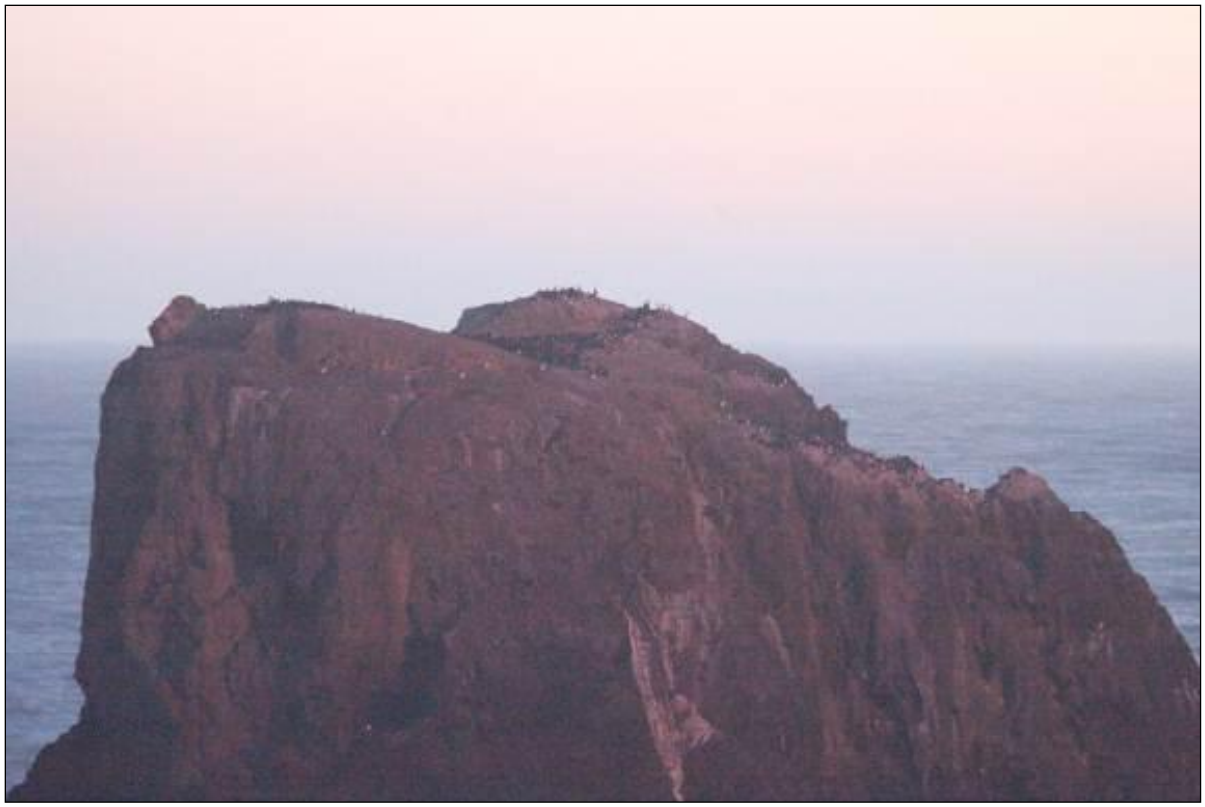


Figure 18. Still time-lapse photograph of the North Coquille Point Rock's common murre and Brandt's cormorant colony illuminated during the fireworks display at 2201 hrs 04 July 2011 (Photo: David B. Ledig/USFWS).

Night-time Sound Recording

Ambient acoustic parameters were recorded with electronic equipment and the sound level of the fireworks reports or salutes were continuously logged during the fireworks display at Pirate Cove Rock and Coquille Point Seabird Colony Complex. Ambient sound levels (composed primarily of crashing surf, prevailing wind) were similar at both locations, ranging from 60 to 65 dB (Figure 19).

The sound levels of fireworks recorded near the seabird colonies averaged 73.0 dB at Pirate Cove Rock (range 69.5 dB to 89.3 dB) and 74.6 dB at Coquille Point Seabird Colony Complex (range 67.1 dB to 93.4 dB). Fireworks sound levels recorded and displayed by the software had a characteristic shark fin appearance. The fireworks displays lasted for approximately 20 minutes and each display ended with a sustained barrage or finale of fireworks lasting between 30 and 40 seconds (Figure 20). Peak acoustic measurements were recorded when single large powder salutes (explosions) were detonated. The loudest sound level recorded during the study (93.4 dB) was produced at the very end of the fireworks display at Coquille Point Seabird Colony Complex.

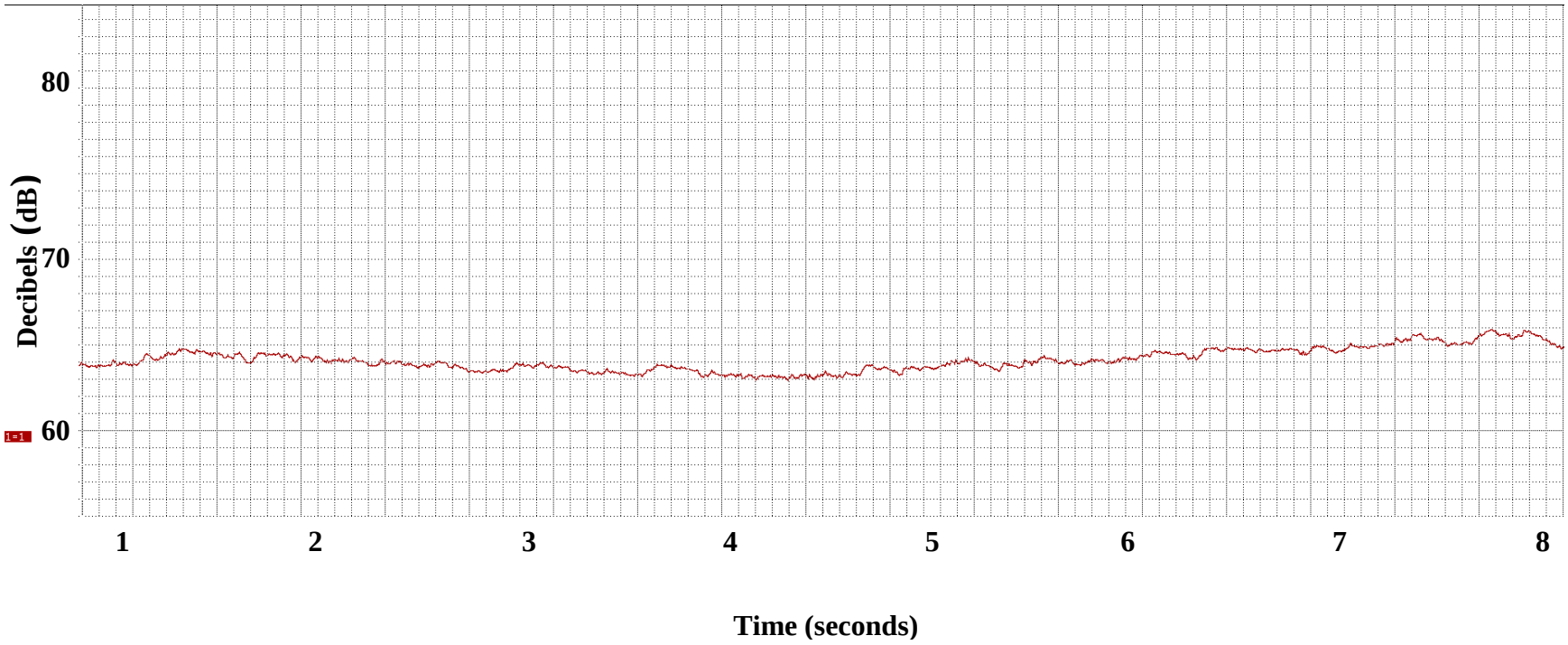


Figure 19. Recording of ambient sound (typical) at Pirate Cove Rock 02 July 2011.

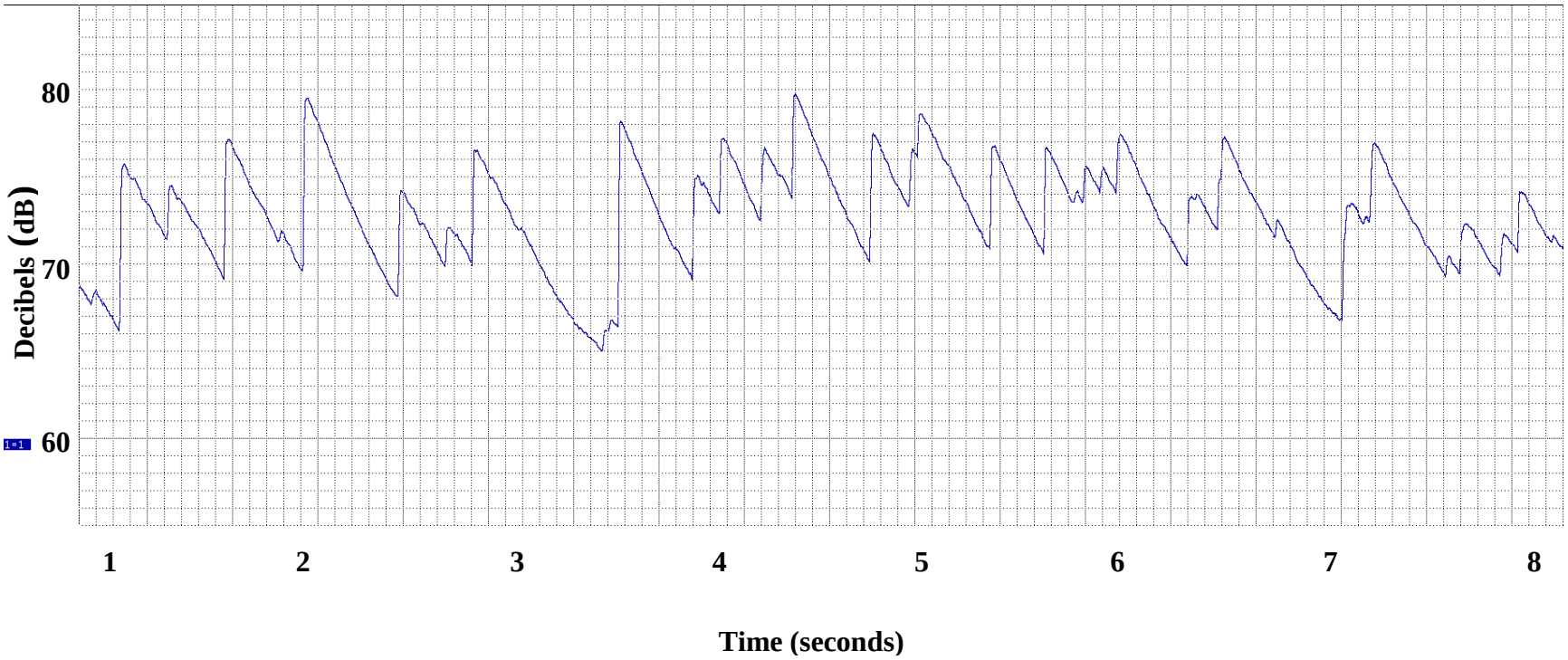


Figure 20. Sound recording graph during the grand finale fireworks display at Pirate Cove Rock 03 July 2011.

Notes on City of Depoe Bay Fireworks Display

Single high intensity salutes detonated at 2130 hrs before the main fireworks display. The main fireworks display started at 2204 hrs and ended at 2222 hrs. Observers did not tally the number of detonations during the fireworks display, however, they were continuous for the entire 18 minute interval.

Weather conditions during the 03 July fireworks display: clear, 5% cirrus cloud cover, 5-10 mph northwest wind shifting to the east, temperature 45-50° F, no precipitation, and fog bank present offshore.

Notes on City of Bandon Fireworks Display

Local citizens ignited private small scale fireworks prior to the main fireworks display. Single high intensity salutes ignited at 2120 and 2133 hrs before the main fireworks display. The main fireworks display started at 2157 hrs and ended at 2220 hrs. Observers did not tally the number of detonations during the fireworks display, however, they were continuous for the entire 23 minute interval.

Weather conditions during the 04 July fireworks display: clear, 20-25 mph northwest wind, temperature 50-55° F, no precipitation, excellent visibility.

DISCUSSION

This study was the first to examine fireworks effects on seabird colony attendance patterns and nest failure rates at treatment sites Pirate Cove Rock and Coquille Point Seabird Colony Complex and reference sites Yaquina Head Seabird Colony Complex and Gregory Point Seabird Colony Complex, Oregon. The objective of this study was to document any level of fireworks-related impacts to surface-nesting colonial seabirds, including identifying any potential disturbance, "take", or 50 CFR violations during Independence Day celebrations on 03 and 04 July 2011. These data also provide baseline information to city, state, and federal land and wildlife managers in developing and guiding future seabird monitoring efforts and management, including other studies of seabird response to fireworks.

Nesting seabird species composition at the treatment sites during 2011 was similar to that from previous surveys (Naughton et al. 2007). However, breeding populations and distribution of seabird species have fluctuated since surveys began in 1979. This study detected no overall change of seabird abundance or trends in daily counts before or after the fireworks display, suggesting that bird presence at Pirate Cove Rock and Coquille Point Seabird Colony Complex was not affected by the fireworks displays. In contrast, Weigand and McChesney (2008) indicated western gulls showed a brief but marked decline in numbers of adults counted on Gualala Point Island, California. The California counts of adult western gulls generally increased through the count period, except for a clear decline that lasted through the day after the fireworks display. These counts were among the lowest of the count period and indicated that many gulls departed the island

and remained away during the course of that day. The data suggest the decline may have been associated with disturbance to gulls recorded the previous night during the fireworks display. Our study's counts did not show this pattern of decline after the fireworks display.

We detected no change of seabird abundance or trends in daily counts before or after the fireworks display, suggesting that bird presence at Pirate Cove Rock and Coquille Point Seabird Colony Complex was not affected by the fireworks displays. However, our study documented daily attendance patterns of pigeon guillemots. The highest pigeon guillemot counts occurred during the first two count periods each day (Appendix 2) at all monitored sites. This pattern was expected because pigeon guillemots tend to congregate near nest sites in early morning at high tide (Carter et al. 1992, Ewins 1993).

We collected data on all surface nesting seabird species present, however, efforts focused on Brandt's cormorant because of their known sensitivity to human disturbance (Hunt et al. 1981, McChesney 1997, Wallace and Wallace 1998, Thayer et al. 1999, Weigand and McChesney 2008). In addition, at the treatment and reference sites a relatively large sample size of Brandt's cormorant nests was observable, which provides good power for quantitative analysis. "Power" is the likelihood of missing a significant difference between two samples when this difference actually exists. To increase the study's power, the most common sensitive species was highlighted in the analysis and numerous techniques (mainland observations, aerial and land-based photography, video) were used. The Brandt's cormorant colony monitoring at Pirate Cove Rock was accomplished by utilizing both land-based nest surveys and a series of aerial digital photographs. Aerial photography provided an instantaneous view of the entire cormorant colony. Land-based nest monitoring, however, was limited because only a small percentage of the colony was visible from the mainland vantage points. However, land-based nest monitoring provided relatively detailed nest status data that could aid the interpretation of the aerial photographs, and provided back-up against bad weather that could have prevented obtaining the aerial photographs.

From the aerial photographs, 189 breeding pairs or nest sites of Brandt's cormorants were identified and monitored on Pirate Cove Rock in 2011. Overall, 94% (n = 178 of 189 total nests) of the nests were successful or active through 08 July. However, 5.8% (n =11) of the nests experienced failure and 9 of the 11 nest failures (82%) occurred on 04 or 05 July after the fireworks display. Nest success at Yaquina Head Seabird Colony Complex (reference site) was calculated from land-based monitoring at 89%, slightly lower than the treatment site. The reference site also experienced a greater failure rate of 11% (n = 8 of 71 total nests) compared to 5.8% (n = 11 of 189 total nests) at the treatment site. The sample size (n =189) was larger at the treatment site compared to the reference site (n =71). Nest failures at the reference site occurred asynchronously over the course of the season and most nest failure occurred on 02 July. The lower nest success and higher nest failure rate at the reference site was likely due to natural disturbance and predation. Bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), American crow (*Corvus brachyrhynchos*), turkey vulture (*Cathartes aura*), and California brown pelican (*Pelecanus occidentalis*) were observed daily

depredating common murre and cormorant eggs and chicks throughout the nesting period (R. Suryan pers. com., USFWS unpublished data). Often, entire sections of incubating seabirds at Colony Rock would take flight in response to invading predatory birds. These constant predation events lowered productivity of common murres and Brandt's cormorants at Yaquina Head during 2011. Western gulls were the only avian opportunistic predators noted at Pirate Cove Rock. No bald eagles, peregrine falcons or other predatory mammals were documented at this seabird colony. We conclude that nest failure rates at the two sites had separate causes and illustrate how natural causes, prevalent at the reference site, play out incrementally and without a clear pattern or cause, over the season. These observations strengthened the inference that the clustered nest failures at Pirate Cove Rock resulted from fireworks disturbance and were not merely coincidental or caused by natural predators.

Aerial photographic analysis of Yaquina Head Seabird Colony Complex (reference site) could not be completed because aerial photographs did not capture the entire Brandt's cormorant colony that was monitored from the mainland vantage point. Approximately 66% of the Brandt's cormorant nests on the various rocks monitored were observed from the mainland vantage point at Yaquina Head Seabird Colony Complex, which is a representative sample of the entire colony. Thus, we determined the Brandt's cormorant data collected from the mainland vantage observation point provided a reliable estimation of nest success or failure rate and aerial photograph analysis was not necessary.

At Pirate Cove Rock, by 02 September only 4 active nests with very large chicks remained and most of the nesting area was abandoned. These data suggested that no pairs that experienced nest failure in July re-nested successfully. Based on an average of 8 days to lay a new egg, a 30-day incubation period, and 30 days until chicks become independent from natal nests (Ainley and Boekelheide 1990, Carter and Hobson 1988), active nests still would have been present on 02 September if re-nesting after 04 July had been successful.

The Brandt's cormorant nest at Pirate Cove Rock that failed on 05 July, when compared to Weigand and McChesney 2008 study's documenting nest failure in this species, indicate that this nest failure most likely associated with fireworks disturbance. Brandt's cormorants sometimes will attend nests for up to several days after nest failure, even refurbishing and sitting in the nest (Weigand and McChesney 2008). Thus, it is possible that the nest recorded as "active" on 04 July had actually already failed but the adults were still attending the nest. Based on behavioral observations during the study, seabirds experienced elevated stress levels during the fireworks display and this may have had an effect lasting up to several days. One observer noted "the birds appeared very agitated and flighty the day after the fireworks event" (C. Krebs USFWS pers. obs.). Also, if a cormorant mate had been disturbed by the fireworks display and subsequently evacuated the area, the breeding pair's nest certainly would have failed because two parents are necessary for cormorants to successfully nest and rear young (Weigand and McChesney 2008).

All of the cormorant nests that failed and were abandoned at Pirate Cove Rock after the fireworks display were located on the perimeter of the colony (Figure 7). Past seabird studies have shown birds that nest on the edge or in low-density portions of a colony can experience higher rates of nest predation and lower breeding success than nests in the interior or denser parts of colonies (Birkhead 1977, Siegel-Causey and Hunt 1981). Also, edge nests are often established later in the breeding season and were more likely to still contain eggs or small chicks on 04 July that were more prone to opportunistic predation by gulls as the attending adults were displaced by the fireworks (Birkhead 1977). All of the cormorant nests that failed on Pirate Cove Rock had eggs or small chicks. Double-crested cormorant chicks on Table Rock were large, mobile, and old enough that they were less susceptible to predation, which may help explain why this colony did not experience nest failure associated with the fireworks.

Pirate Cove Rock is an important nesting site for Brandt's and pelagic cormorants. Also, the coast between Newport and Depoe Bay at Otter Crest Headland has historically been a nesting area for hundreds of cormorants. A peak count of 479 pelagic cormorant nests was recorded in July 2004 (Naughton et al. 2007). The annual 2011 cormorant survey revealed only two abandoned cormorant nests at the Otter Crest Headland colony, a sharp contrast to previous years (USFWS unpublished data). This cormorant species is very sensitive to prey availability and climate change, as well as human disturbance (Carter et al. 1984, Ainley and Boekelheide 1990, Weigand and McChesney 2008). In addition, a recent increase in natural avian predator populations (e.g., bald eagle, peregrine falcon, turkey vulture, etc.) has contributed to the reduced cormorant productivity along the north and central Oregon coast (USFWS unpublished data). It appears some nesting colonies of cormorants are already predator stressed and experiencing decreased nesting success in the general area. USFWS is concerned that fireworks displays add to the cumulative stresses that this species (and others) already experiences, and may result in further population declines.

Aerial photographic data of the Brandt's cormorant colony from Chief's Island and North Coquille Point Rock were difficult to interpret. Unfortunately, we could not track a substantial subset of nests at North Coquille Point Rock after 04 July with any degree of confidence because of photographic limitations. We could only report a total count of nests visible on each date. Based on those numbers, there was a decline from 04 to 05 July, but by 08 July the nest count was back to the same number as on 03 July. We suggest the apparent decline is an artifact of the low angle (oblique) of the photographs from that date which allowed common murres to obscure some Brandt's cormorant nests. Thus, this study's aerial photography results are inconclusive on whether the North Coquille Point Rock seabird colony was disturbed by the City of Bandon fireworks.

Due to the difficulty of interpreting the aerial photographs of the south coast sites, we relied on land-based observation data to determine effects of fireworks disturbance. Comparison of nest failure percentages at the two sites revealed similar results between species. Double-crested cormorants had no nest failure at both sites. However, 75 double-crested cormorant mainland nests failed for unknown reasons prior to the core monitoring period (mid-June) at Gregory Point, and we could not track nests at Table

Rock in aerial photographs because chicks were already fledging during the core monitoring period. Brandt's cormorant experienced 4.5% nest failure (n = 1 of the 22 total nests) at the treatment site and 0% or no failure observed at the reference site. Nesting western gulls lost one nest at the treatment site and two at the reference site which resulted in 4.8% (n = 1 of the 21 total nests) and 14% (n = 2 of the 14 total nests) nest failure respectively. These data together with behavioral observations fail to support the conclusion that seabird species nest failures were affected by the Bandon fireworks display at the Coquille Point Seabird Colony Complex. However, since evidence of fireworks induced nest failures at Pirate Cove Rock was obtained from analyses of aerial photography, and the Coquille Point aerial photography was not interpretable, we cannot confidently state that Bandon fireworks were benign. Additional study of this site is needed to substantiate this study's results.

Night-time photographic monitoring documented behavior consistent with the nest failure observations, showing much greater levels of stress in birds, including nest site abandonment, at Pirate Cove Rock as compared to the Coquille Point seabird colonies. During such severe disturbance events, cormorants may depart their nests, leaving eggs and chicks susceptible to predators such as gulls or they may accidentally kick eggs out of the nest (McChesney 1997, Wallace and Wallace 1998). Aerial photographs taken on 04 July (the day after the fireworks event) at Pirate Cove Rock captured gulls standing next to failed or abandoned cormorant nests (Figure 9). This behavior suggests the cormorant nests may have been depredated by gulls. However, observers did not actually witness cormorant nests being depredated by gulls or any other predatory species. Following the cessation of the disturbance, birds may either return to their nests or they may abandon nesting efforts entirely (Weigand and McChesney 2008). At failed nests, the adults vacated the area and sometimes were observed standing by the empty nest platform. In some cases, the nest material was removed and used at nearby active nests (Figure 9). Thus, the photographic evidence supports the conclusion that failure of nests on 04 and 05 July at Pirate Cove Rock resulted from fireworks disturbance.

Fireworks displays can reach sound levels of 140 dB (Figure 21). Sound levels of the fireworks recorded near the seabird colonies were much lower due to the distance of the colonies from the displays. Average sound levels were similar to those produced by normal street noise (70 dB) or a telephone dial tone (80 dB), while the louder pyrotechnics reached levels comparable to heavy truck traffic (90 dB, Figure 21). Sustained sound levels at or above 85 dB can result in permanent hearing loss in humans. Ambient sound levels (composed primarily of crashing surf, prevailing wind) were similar at both study locations, ranging from 60 dB to 65 dB. These sound levels were similar to levels encountered by people during conversational speech (Figure 21).

However, the impact of noise on seabirds depends not only on the level of sound, but whether it is constant and predictable, in contrast to sounds that are sudden and unexpected (Dwyer and Tanner 1992, Boersma et al. 2002). For example, researchers studied the response of breeding trumpeter swans to human disturbance occurring along Copper River Highway, near Cordova, Alaska. The nesting area was in close proximity to the highway and the swans habituated to constant nearby traffic noise. Swans were

most sensitive to the noise and visible presence of stopped vehicles, pedestrians, and researchers. These disturbances led to frequent recesses (i.e., leaving the nest) by incubating females, to uncharacteristic brood movements, and to significant behavior changes (Henson and Grant 1991). The Pirate Cove Rock seabird colony is located near urban development and is exposed to constant traffic noise and human presence. However, the fireworks emitted a high level of explosive sound that was unexpected or sudden and caused birds to become physically stressed, flush from their nests, and in some cases ultimately lead to nest failure.

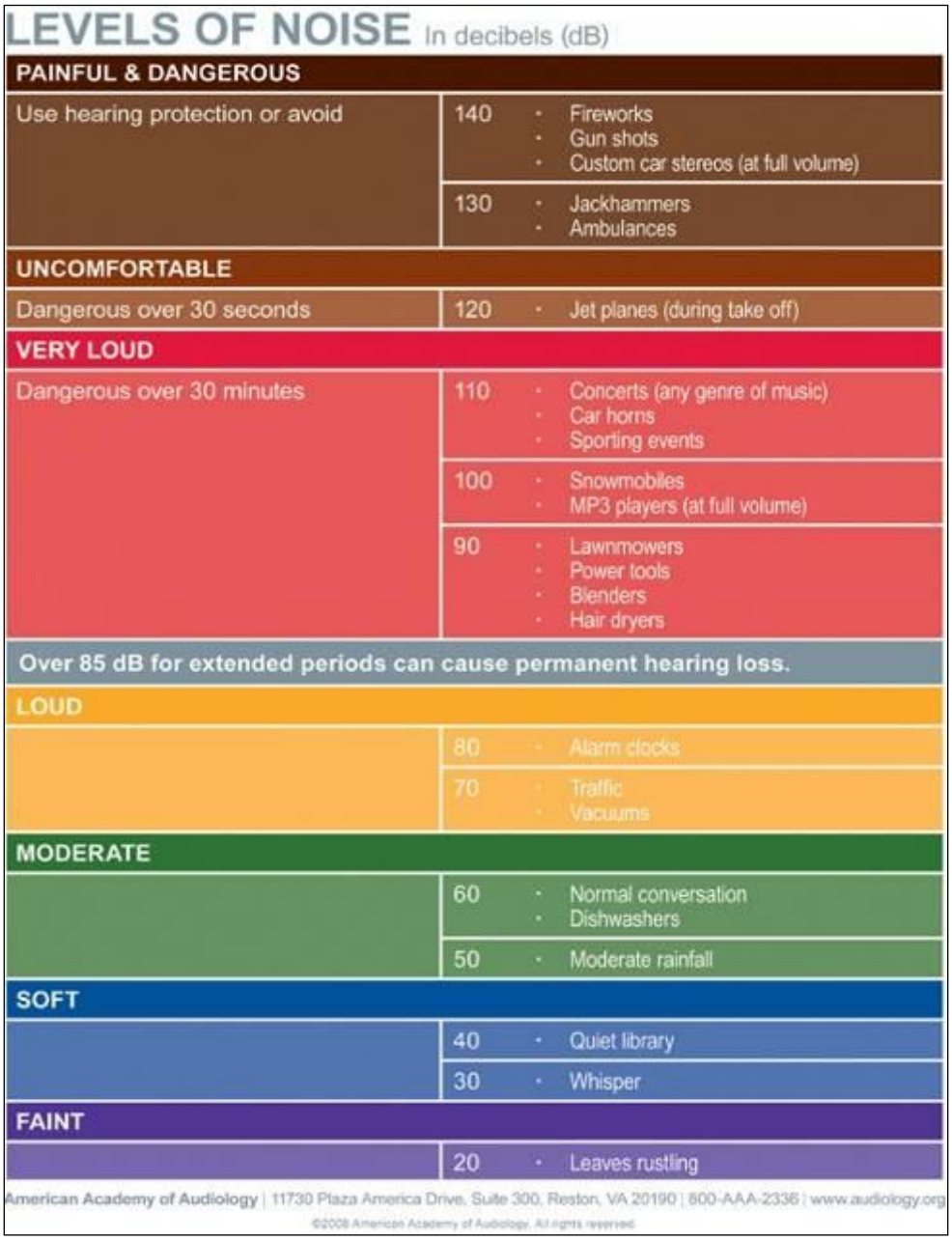


Figure 21. Levels of noise in decibels (dB), potential causes, and the corresponding effect on humans (American Academy of Audiology 2008).

MANAGEMENT RECOMMENDATIONS

Seabirds are protected under the Migratory Bird Treaty Act of 1918. The statute makes it unlawful to pursue, hunt, take, capture, kill, or sell migratory birds. Since mortality of eggs, chicks, or abandonment of nests and disturbance to seabirds occurred as a result of nearby fireworks, U.S. Fish and Wildlife Service must take steps to ensure protection of seabirds.

This study's results indicated that fireworks launch sites in close proximity to nesting seabirds can result in unlawful disturbance and nest failure. Careful consideration of sensitive wildlife and planning of large-scale celebratory fireworks events must be implemented to eliminate impacts to nesting seabirds. The fireworks display by the city of Bandon on 04 July 2011 did not appear to impact nest success of the seabirds at Coquille Point Seabird Colony Complex. However, the Pirate Cove Rock seabird colony experienced high levels of stress and displacement behavior that lead to Brandt's cormorant nest failure. This negative impact to the colony is attributed to the city of Depoe Bay fireworks display. This study's findings infer that the distance of the nesting colony from the fireworks launch site is an important factor and directly relates to disturbance. The Pirate Cove Rock colony is 1.21 km from the fireworks launch site and this colony experienced sudden and unexpected high levels of disturbance from this celebratory event. The Coquille Point Seabird Colony Complex, however, ranges from 1.84 to 2.19 km from the launch site and did not experience as high level of disturbance. The Gualala Point Island colony in California was 1.8 km from the launch site and the birds experienced nest failure (Weigand and McChesney 2008) similar to Pirate Cove Rock colony. It is our best professional judgment that fireworks launch sites should be greater than 2 km from any existing surface–nesting seabird colony to avoid potential disturbance. In addition, we suggest use of a less powerful and narrow spectrum selection of fireworks be used to lessen explosive sound and light impacts to seabirds. Also, the fireworks should be launched in a direction away from the colony and detonated as far as possible from the colony to help reduce sudden noise and light.

Additional studies are needed to collect long-term data sets and to fully evaluate potential impacts of fireworks displays on seabird species. USFWS needs to continually monitor seabird colonies potentially affected by fireworks to determine and document reproductive success. This information could then be placed in context with other potential factors that influence seabirds such as other human disturbances, ocean currents, bottom topography, food availability, weather, predators, and climate change.

ACKNOWLEDGMENTS

We acknowledge and thank the dedicated observers that assisted with the study including Barbara Taylor, Ben Wishnek, Erin Kunisch, Coty Krebs, Amanda Gladics, Alex Gulick, and Cheryl Horton. Mike Szumski and Mike Fousie assisted with the sound recording, digital photographic equipment, and data analysis. All coworkers spent many long tedious hours in extreme weather conditions collecting data. We also thank Brenda Fries (General Sales Manager) of WorldMark by Wyndham® Hotel, Depoe Bay for allowing observers to monitor seabirds from their third-floor balcony. Mary and Ron Gillam of Depoe Bay allowed personnel to conduct observations from their backyard. A special thanks to aircraft pilots Trevor Walker of Northwest Helicopters, Olympia, Washington and Jack Christopherson of Wilderness Air Charters, Inc., Salem, Oregon for providing safe and effective aerial flights. The authors are grateful to reviewers Brian Root, Kevin Kilbride, Nanette Seto, Holly Freifeld, Vivian Mendenhall, Ph.D., and Robert Suryan, Ph.D. for improving this report, but retain responsibility for any errors, omissions, or ambiguities that remain. Liz Cruz produced the study area figures.

LITERATURE CITED

Ainley, D.G. and R.J. Boekelheide. 1990. Seabirds of the Farallon Islands: ecology, dynamics, and structure of an upwelling-system community. Stanford, CA: Stanford University Press. 450pp.

Birkhead, TR. 1977. The effect of habitat and density on breeding success in the Common Guillemot (*Uria aalge*). Journal of Animal Ecology 46(3): 751-764.

American Academy of Audiology. 2008. www.HowsYourHearing.org. American Academy of Audiology, 11730 Plaza American Drive, Suite 300, Reston, VA 20190.

Boersma, P.D., J.A. Clark, and N. Hillgarth. 2002. Seabird conservation. *In* E.A. Schreiber and J. Burger, eds. Biology of Marine Birds, Pp. 559-579. CRC Press, New York.

Carney, K.M. and W.J. Sydeman. 1999. A review of human disturbance effects on nesting colonial waterbirds. Waterbirds 22(1): 68-79.

Carter, H.R. and K.A. Hobson. 1988. Creching behavior of Brandt's cormorant chicks. Condor 90(2): 395-400.

Carter, H.R., K.A. Hobson, and S.A. Sealy. 1984. Colony-site selection by Pelagic Cormorants (*Phalacrocorax pelagicus*) in Barkley Sound, British Columbia. Colonial Waterbirds 7(1):25-34.

Carter, H.R., G.J. McChesney, D.L. Jaques, C.S. Strong, M.W. Parker, J.T. Takekawa, D.L. Jory, and D.L. Whitworth. 1992. Breeding populations of seabirds in California, 1989-1991. Unpublished draft report, 2 volumes. Dixon, CA: USDI Fish and Wildlife Service, Northern Prairie Wildlife Research Center. Various pagination.

Dwyer, N.C. and G.W. Tanner. 1992. Nesting success in Florida sandhill cranes. Wilson Bull 104:22-31.

Ewins, PJ. 1993. Pigeon Guillemot (*Cepphus columba*). *In*: Poole, A; Gill, F, eds. The Birds of North America. No. 49. Philadelphia, PA: The Academy of Natural Sciences.

Henson, P. and T.A. Grant. 1991. The effects of human disturbance on trumpeter swan breeding behavior. Wildl Soc Bull 19:248-257.

Hunt, G.L., Jr., R.L. Pitman, M. Naughton, K. Winnett, A. Newman, P.R. Kelly, and K.T. Briggs. 1981. Summary of marine mammal and seabird surveys of the Southern California Bight area 1975-1978. Vol. III – Investigators' Reports. Part III. Seabirds – Book II. Publication PB-81-248-05. Springfield, VA: US Department of Commerce, National Technical Information Service. 337 pp

McChesney, G.J. 1997. Breeding biology of the Brandt's Cormorant on San Nicolas Island, California. M.S. Thesis. Sacramento, CA: California State University. 201 pp

McChesney, G.J., L.E. Eigner, T.B. Poitras, P.J. Kappes, N.M. Jones, D.N. Lontoh, P.J. Capitolo, R.T. Golightly, D. Le Fer, H.R. Carter, S.W. Kress, and M.W. Parker. 2007. Restoration of common murre colonies in central California: annual report 2006. Unpublished report, U.S. Fish and Wildlife Service, San Francisco Bay National Wildlife Refuge Complex, Newark, California.

Naughton, M.B., D.S. Pitkin, R.W. Lowe, K.J. So, and C.S. Strong. 2007. Catalog of Oregon seabird colonies. U.S. Department of Interior; Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R1009-2007, Washington, D.C.

Riemer, S.D. and R.F. Brown. 1997. Monitoring human-wildlife interactions and disturbance of seabirds and pinnipeds at Three Arch Rocks National Wildlife Refuge, 1993-1994. Oregon Department of Fish and Wildlife Diversity Program, Marine Region, Newport, OR. Technical Report # 97-6-01.

Rojek, N.A., M.W. Parker, H.R. Carter, and G.J. McChesney. 2007. Aircraft and vessel disturbances to Common Murres *Uria aalge* at breeding colonies in central California, 1997–1999. Marine Ornithology 35(1): 67–75.

Siegel-Causey, D and G.L. Jr. Hunt. 1981. Colonial defense behavior in Double-crested and Pelagic cormorants. Auk 98(3): 522-531.

Smith, E.P. 2002. BACI design. Encyclopedia of Environmetrics (ISBN 0471 899976), edited by A.H. El-Shaarawi and W.W. Piegorsch, John Wiley & Sons, Ltd, Chichester. 9pp.

Stephensen, S.W. 2009. Habitat selection by Kittlitz's and marbled murrelets in Harriman Fjord, Prince William Sound, Alaska. Master of Science Thesis. University of Alaska Anchorage. 84 pp.

Thayer, J.A., W.J. Sydeman, N.P. Fairman, and S.G. Allen. 1999. Attendance and effects of disturbance on coastal Common Murre colonies at Point Reyes, California. Waterbirds 22(1): 130-139.

U.S. Fish and Wildlife Service (USFWS). 1980. Oregon Islands and Three Arch Rocks wilderness management plan. Western Oregon National Wildlife Refuge Complex, Corvallis, Oregon.

U.S. Fish and Wildlife Service (USFWS). 2009. Oregon Islands, Three Arch Rocks, and Cape Meares National Wildlife Refuges: comprehensive conservation plan and wilderness stewardship plan. Oregon Coast National Wildlife Refuge Complex, Newport, Oregon.

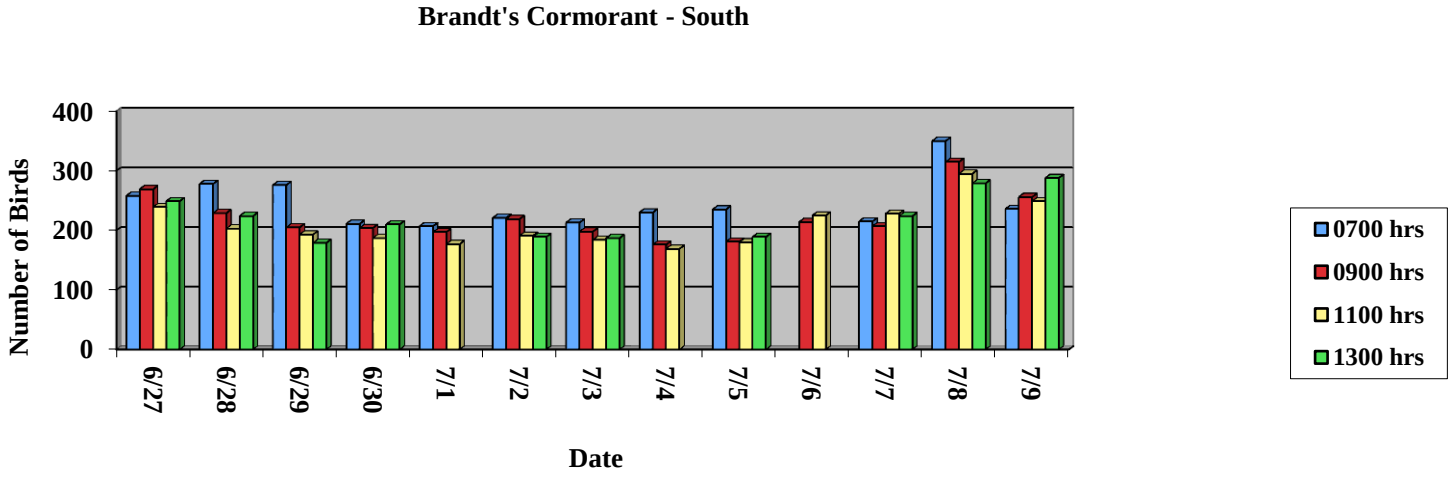
U.S. Fish and Wildlife Service (USFWS). 2010. Aerial Seabird Census Training Manual. Oregon Coast National Wildlife Refuge Complex, Newport, Oregon. Unpublished report.

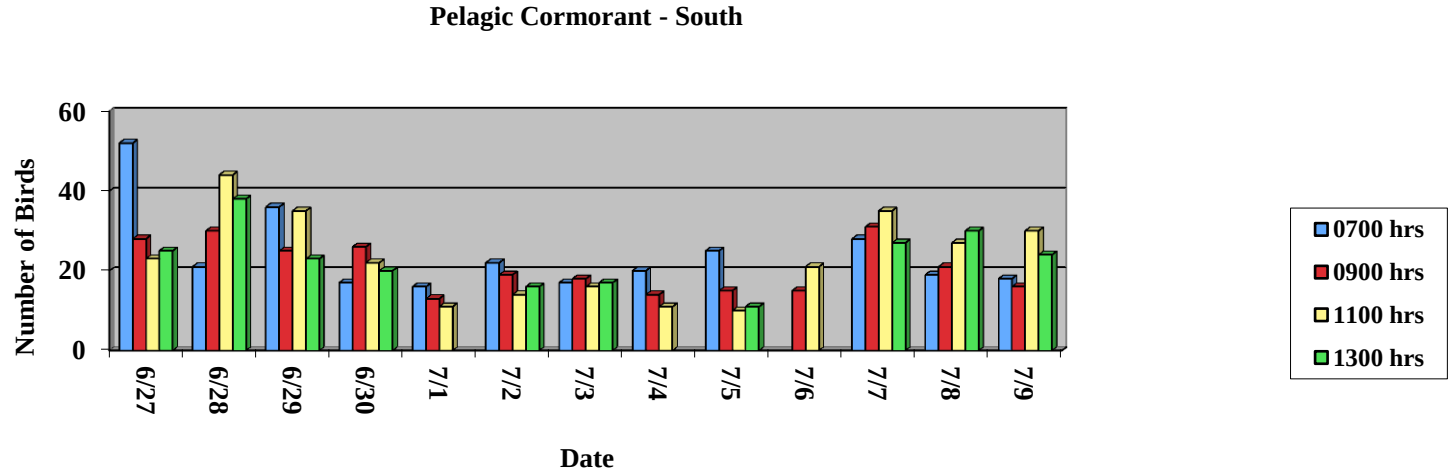
Wallace, E.A.H. and G.E. Wallace. 1998. Brandt's Cormorant (*Phalacrocorax penicillatus*). *In* The Birds of North America, No. 362 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Weigand, J.F., and G.J. McChesney. 2008. Seabird and marine mammal monitoring and response to a fireworks display at Gualala Point Island, California, Sonoma County, May to August 2007. Unpublished report, USDI Bureau of Land Management, California State Office, Sacramento, CA; and USDI Fish and Wildlife Service, San Francisco Bay National Wildlife Refuge Complex, Newark, CA. 38 pp.

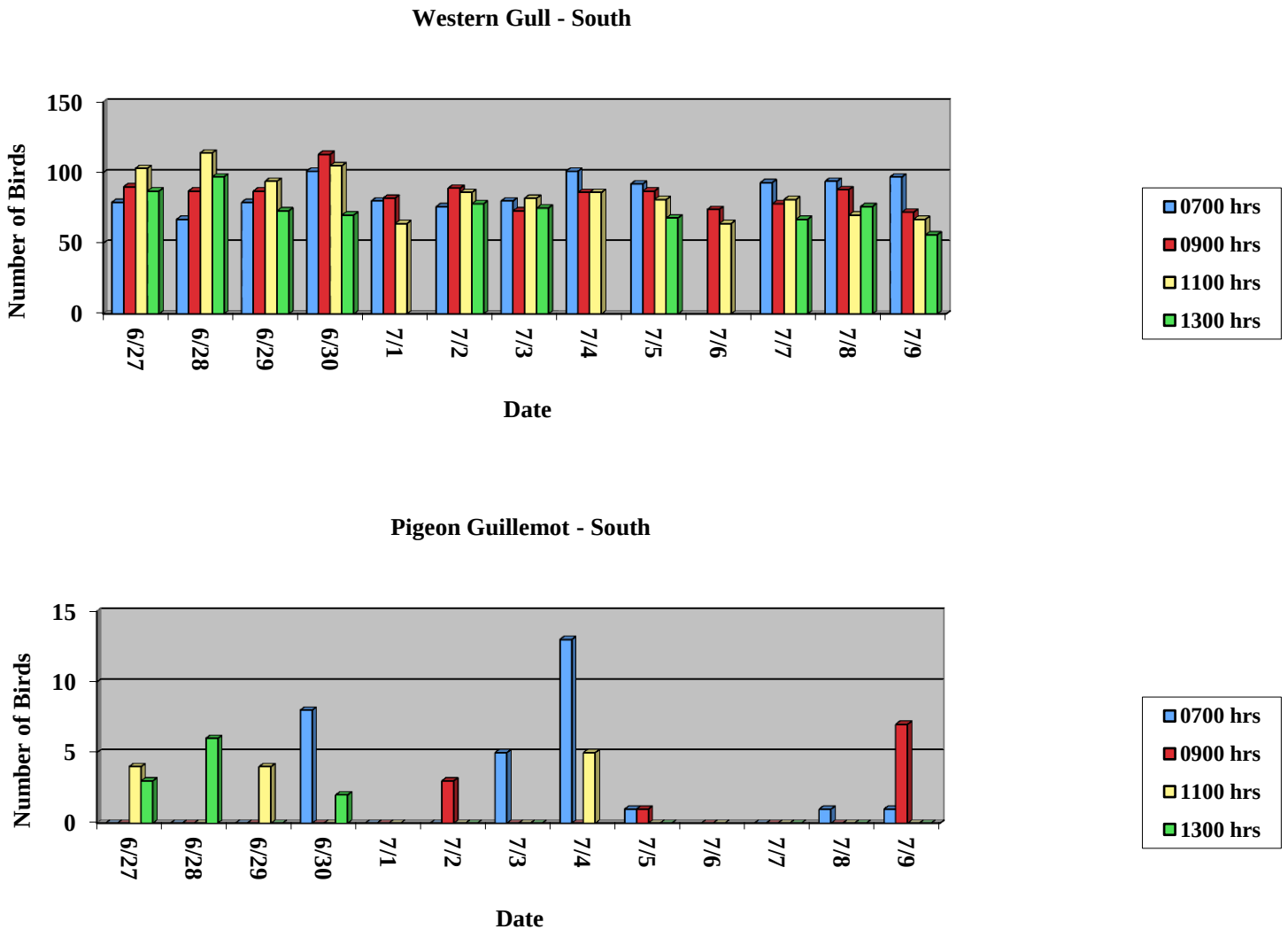
Wengert, G.M. and M.W. Gabriel. 2002. Waterbird chick mortality associated with fireworks during the breeding season. Manuscript. McKinleyville, CA: Integral Ecology Reseach Center. 11 pp

Appendix 1. Seabird census totals by species, vantage point (South or East), and time of day at Pirate Cove Rock 27 June to 09 July 2011.

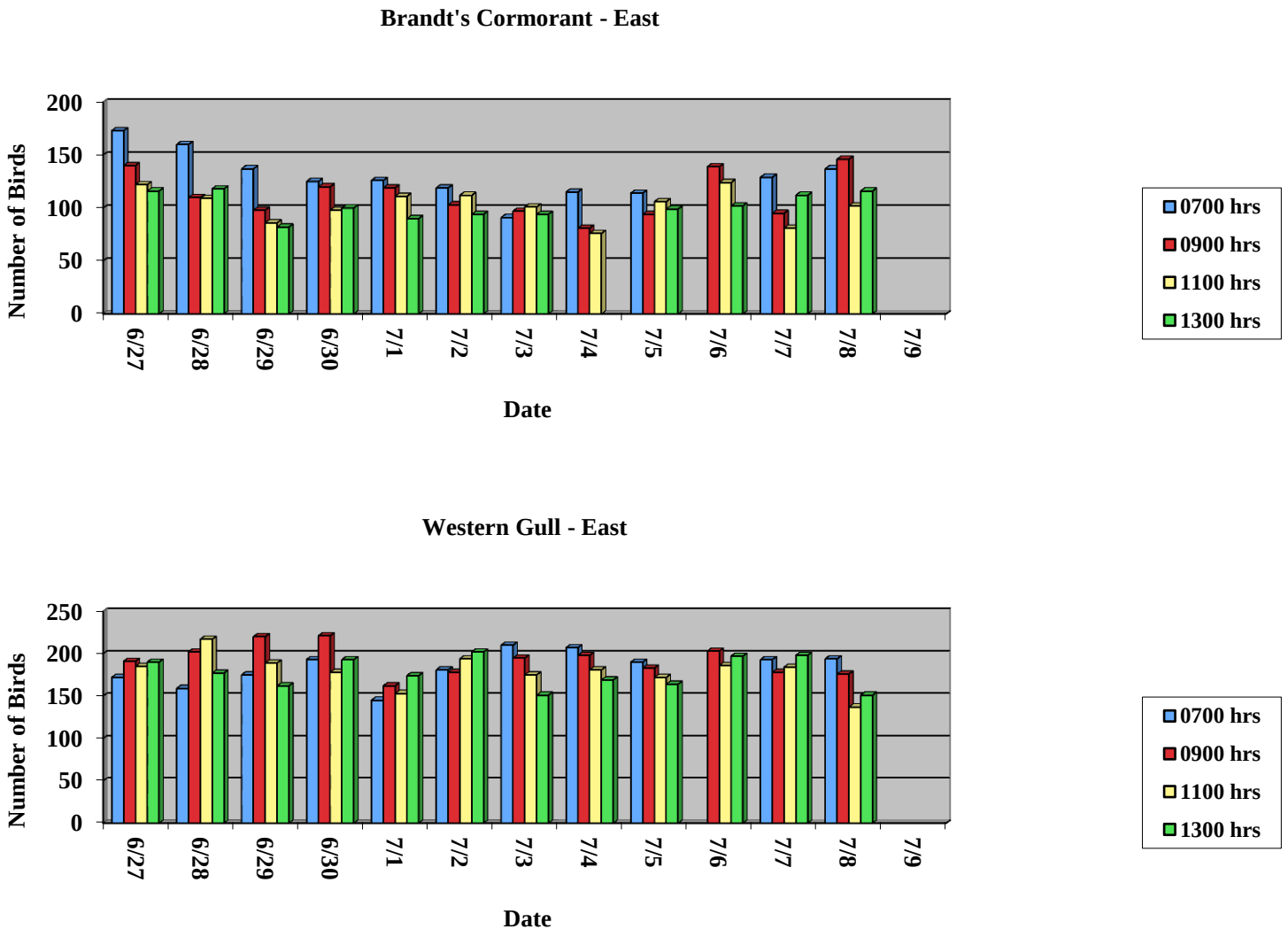




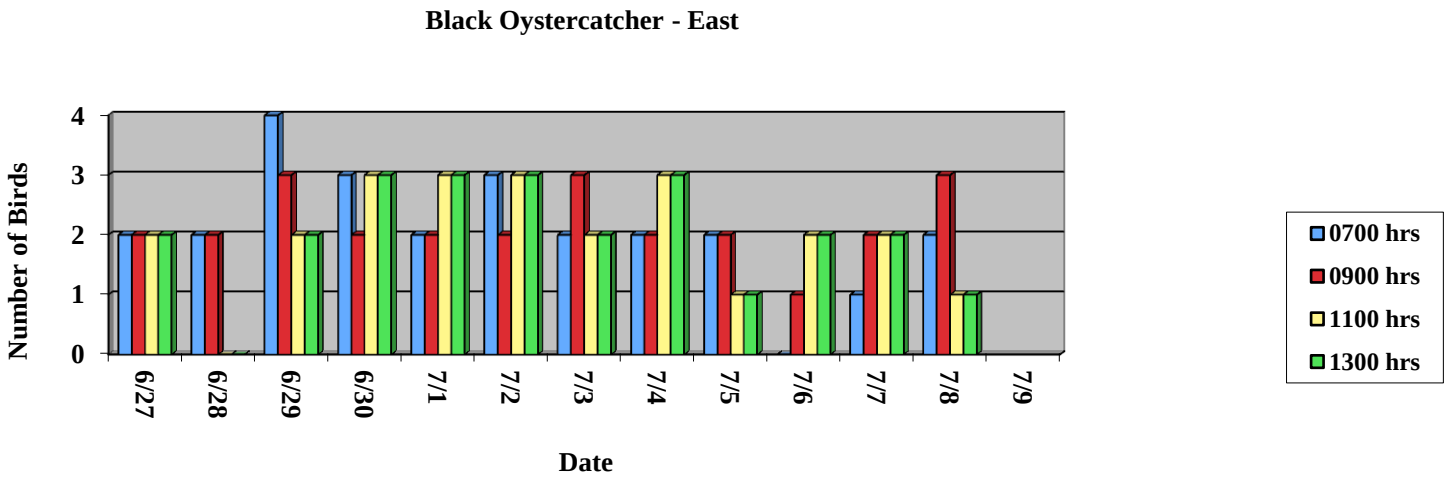
Appendix 1 (cont.).



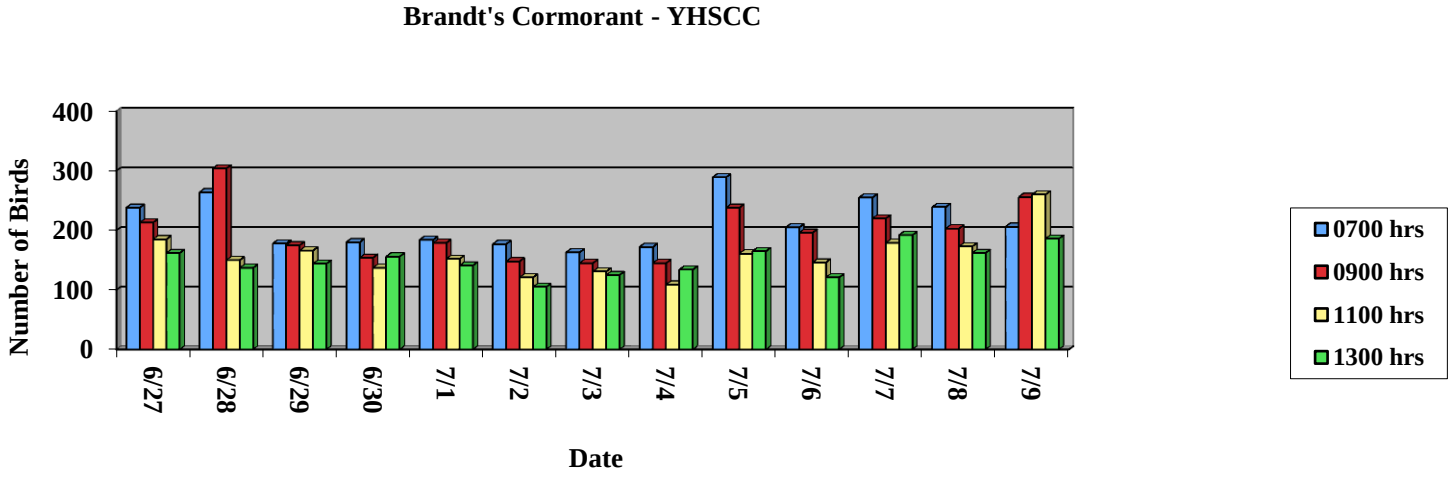
Appendix 1 (cont.).

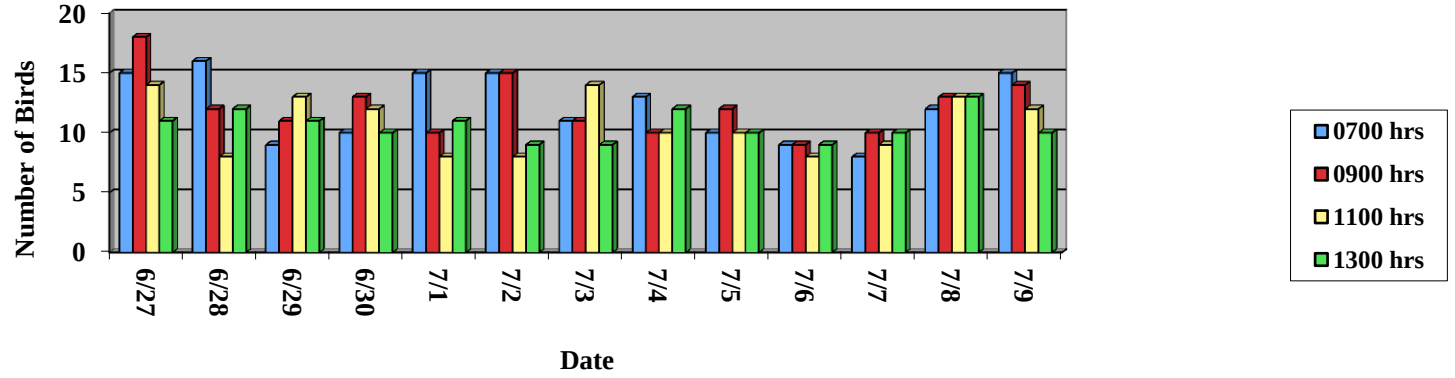


Appendix 1 (cont.).

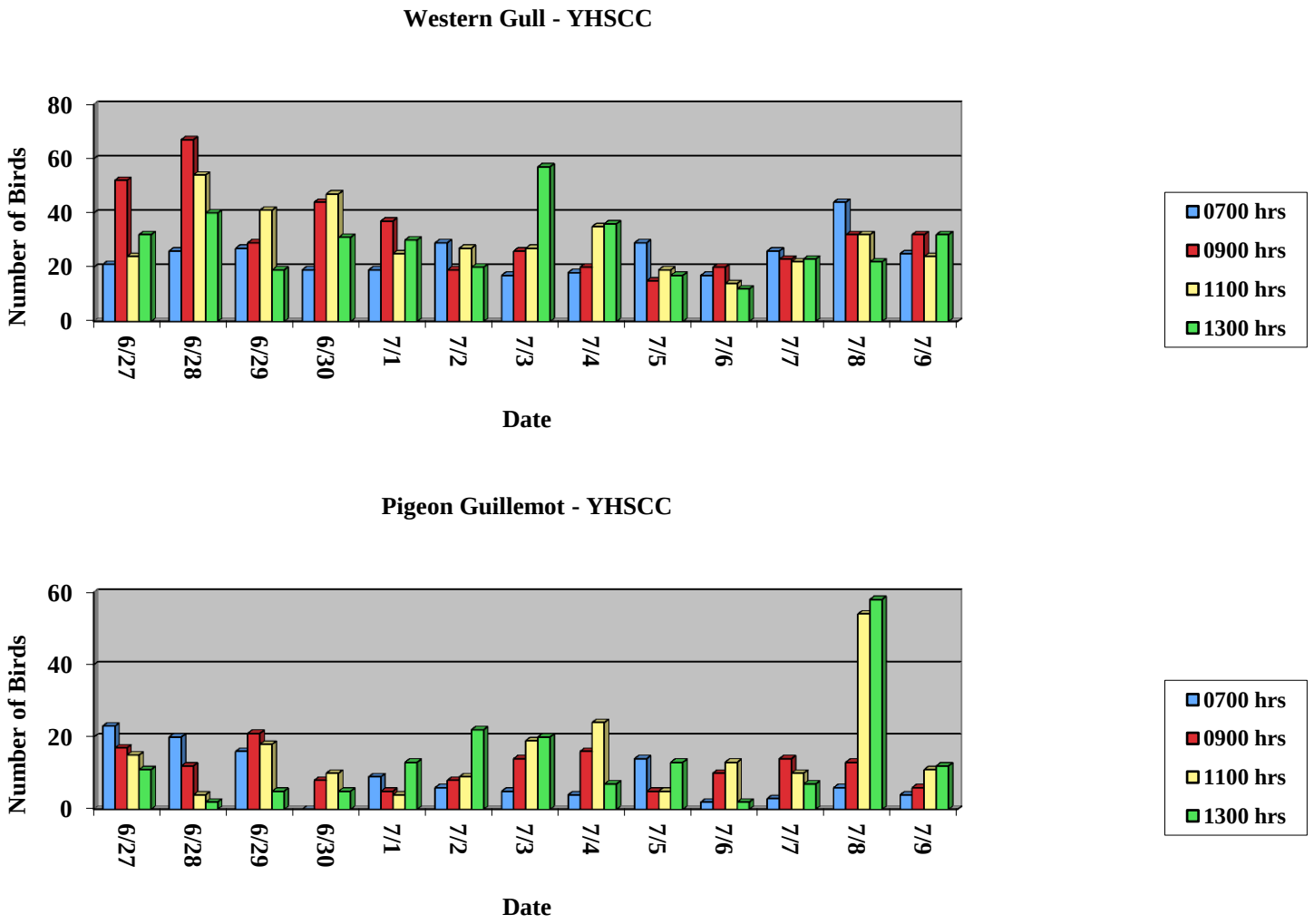


Appendix 2. Seabird census totals by species and time of day at Yaquina Head Seabird Colony Complex (YHSCC) 27 June to 09 July 2011.



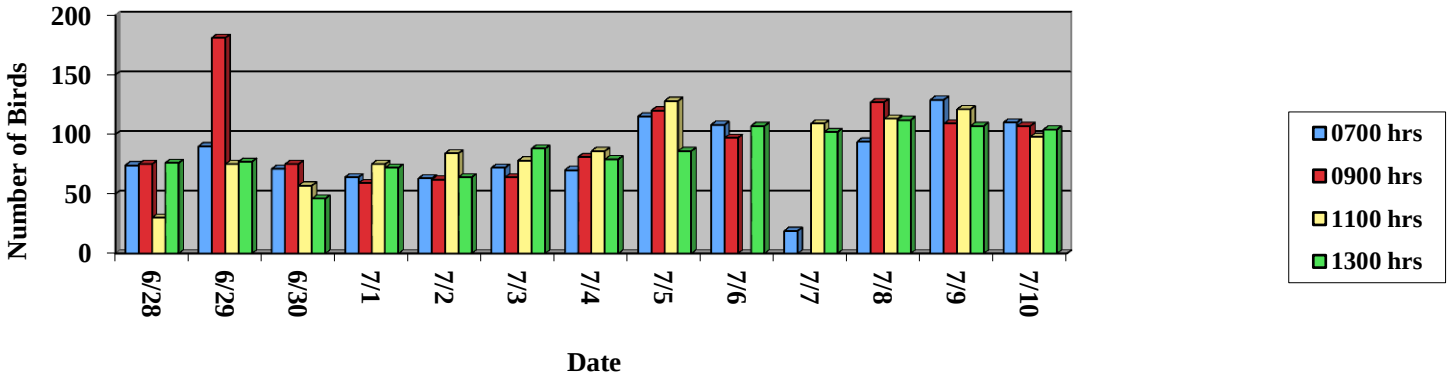


Appendix 2 (cont.).

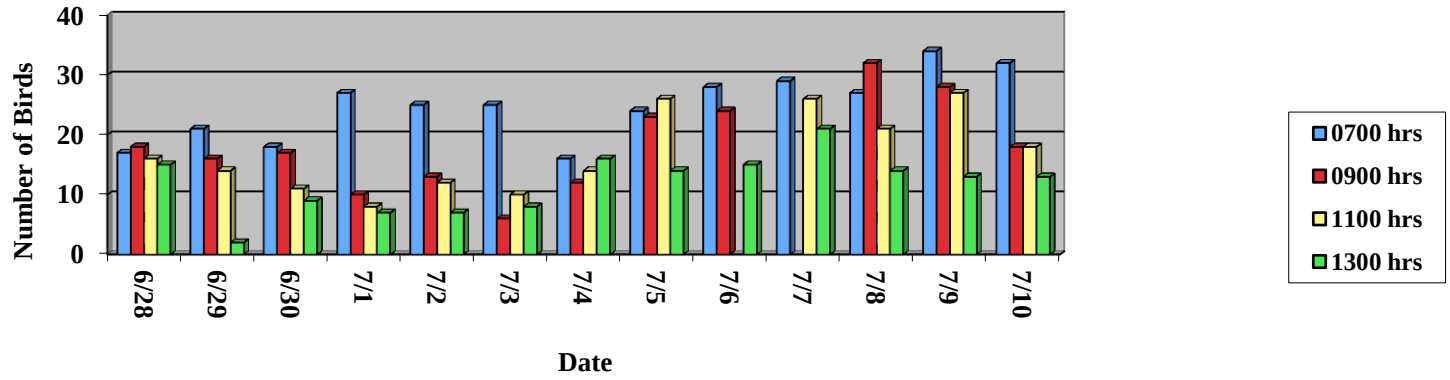


Appendix 3. Seabird census totals by species and time of day at Coquille Point Seabird Colony Complex (CPSCC - Table Rock, North Coquille, Middle Coquille) 28 June to 10 July 2011.

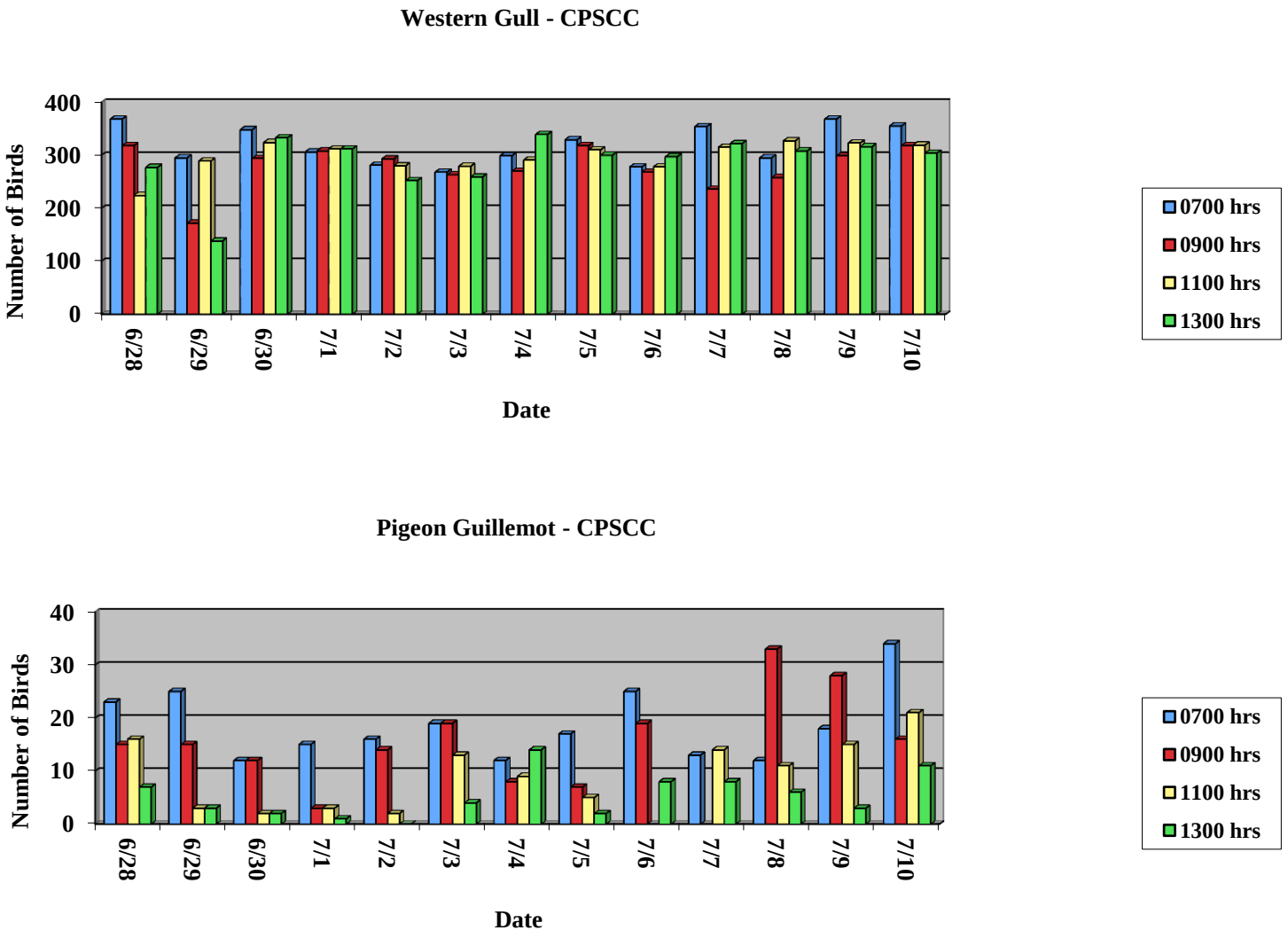
Brandt's Cormorant - CPSCC



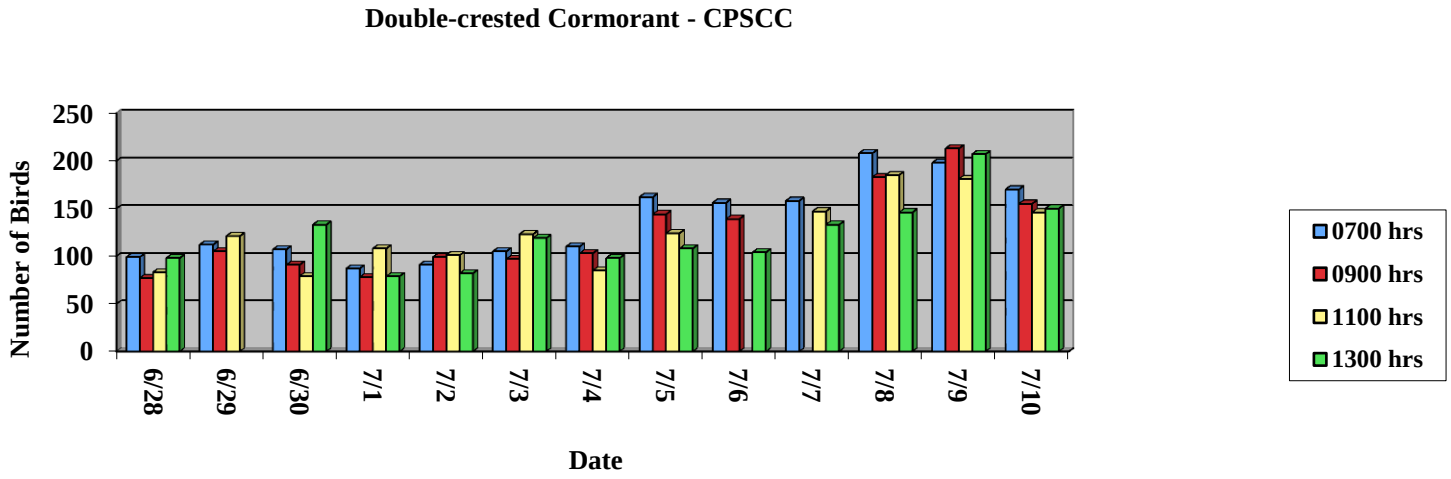
Pelagic Cormorant - CPSCC



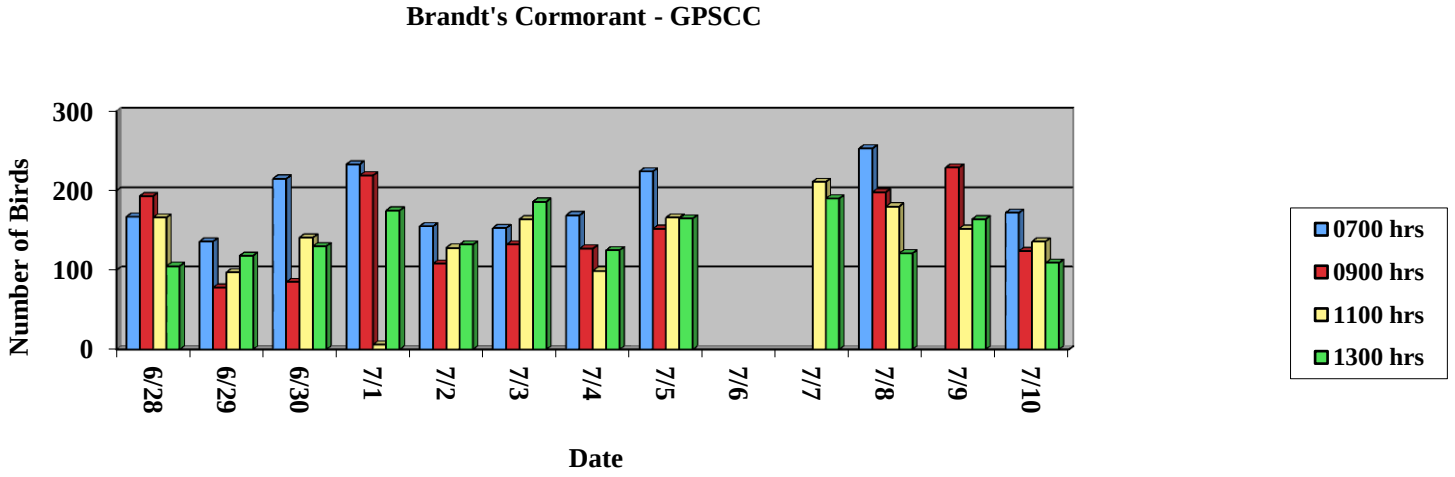
Appendix 3 (cont.).

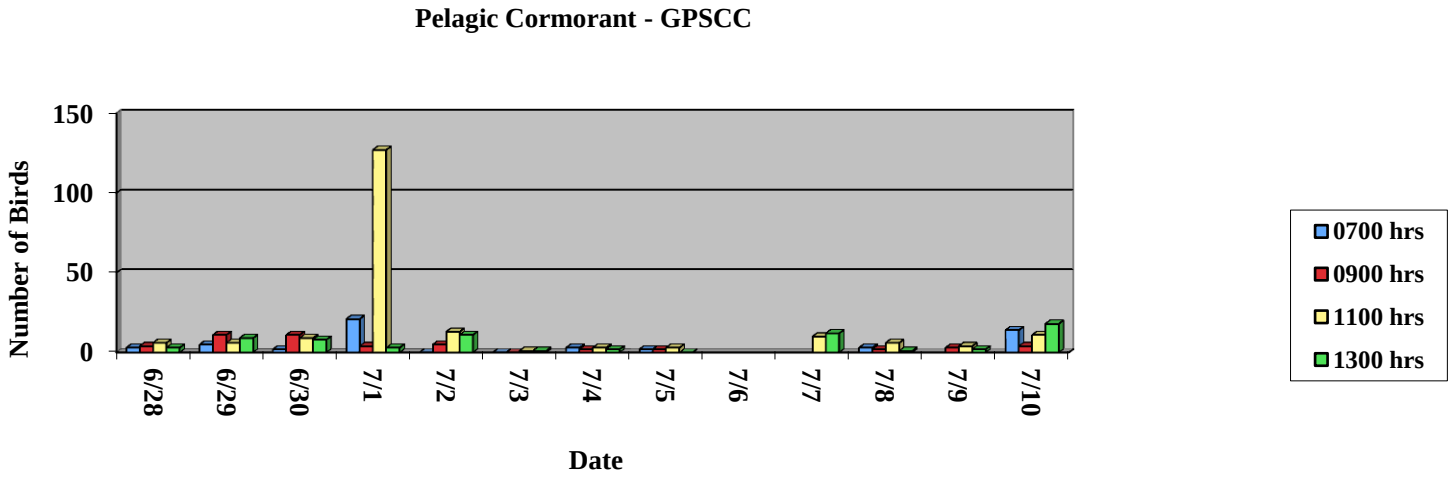


Appendix 3 (cont.).

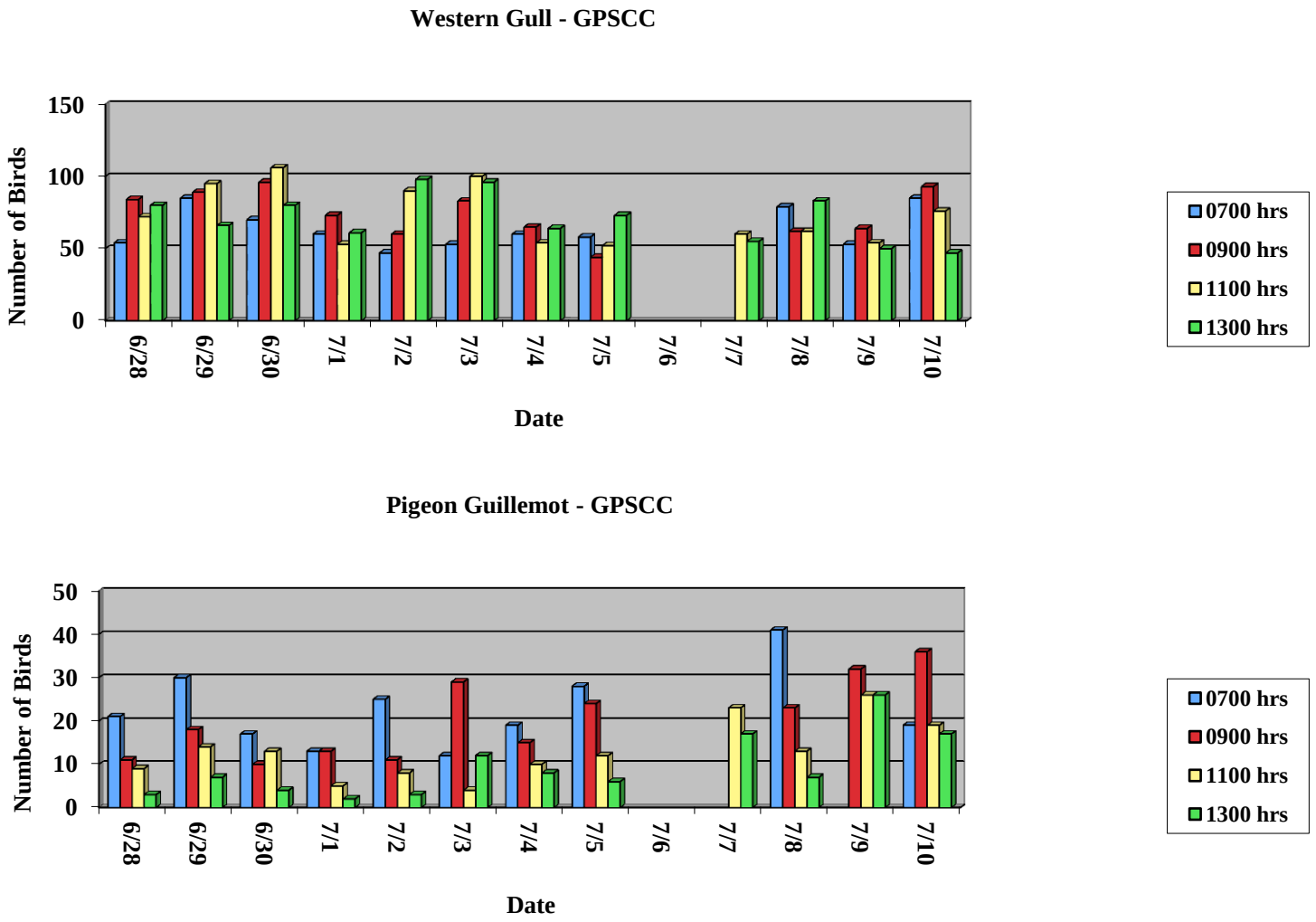


Appendix 4. Seabird census totals by species and time of day at Gregory Point Seabird Colony Complex (GPSCC) 28 June to 10 July 2011.

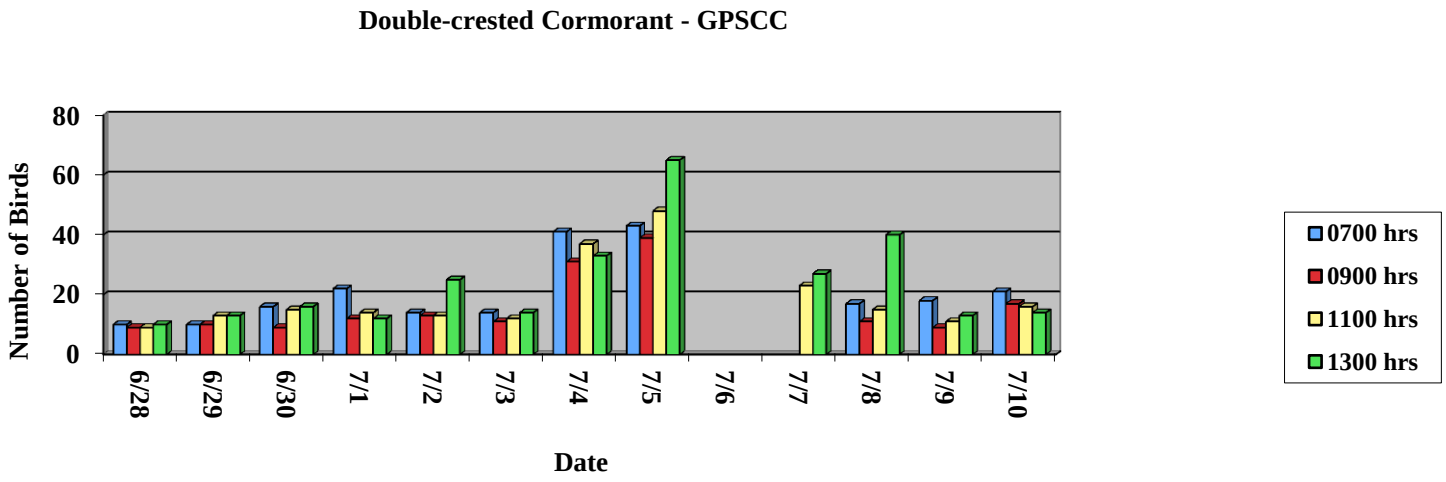




Appendix 4 (cont.).



Appendix 4 (cont.).



Appendix 5. Brandt's cormorant nest data collected from mainland south vantage point at Pirate Cove Rock 29 June to 15 July 2011.

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
6/27/2011	10C	B	W	E1	IP
6/27/2011	11C	B	F	U	IP
6/27/2011	12C	B	W	E2	IP
6/27/2011	13C	B	W	U	IP
6/27/2011	14C	B	W	E1	IP
6/27/2011	15C	B	F	U	IP
6/27/2011	16C	B	F	U	IP
6/27/2011	17C	B	W	U	IP
6/27/2011	18C	B	W	E1	IP
6/27/2011	19C	B	UC	E1	IP
6/27/2011	1C	B	F	U	IP
6/27/2011	21C	B	F	E2	IP
6/27/2011	23C	B	W	E3	IP
6/27/2011	23C	B	F	E1	IP
6/27/2011	2C	B	W	U	IP
6/27/2011	3C	B	F	U	IP
6/27/2011	4C	B	W	U	IP
6/27/2011	54C	B	W	E2	IP
6/27/2011	56C	B	F	E1	IP
6/27/2011	59C	B	W	E2	IP
6/27/2011	5C	B	W	U	IP
6/27/2011	66C	B	W	E2	IP
6/27/2011	68C	B	W	E2	IP
6/27/2011	69C	B	F	E2	IP
6/27/2011	6C	B	F	U	IP
6/27/2011	72C	T	P	U	BU
6/27/2011	7C	U	UC	U	IP
6/27/2011	82C	B	F	E1	IP
6/27/2011	9C	T	P	U	B
6/28/2011	10C	B	W	E1	IP
6/28/2011	11C	T	P	U	IP
6/28/2011	120C	B	F	E1	IP
6/28/2011	122C	B	F	U	IP
6/28/2011	12C	B	F	U	IP
6/28/2011	13C	B	W	U	IP
6/28/2011	14C	B	W	U	IP
6/28/2011	17C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
6/28/2011	19C	B	F	E2	IP
6/28/2011	31C	B	F	E1	IP
6/28/2011	35C	B	W	E2	IP
6/28/2011	42C	B	F	U	IP
6/28/2011	4C	B	W	E2	IP
6/28/2011	50C	B	F	E1	IP
6/28/2011	51C	B	W	E2	IP
6/28/2011	54C	B	F	E1	IP
6/28/2011	59C	B	W	E3	IP
6/28/2011	68C	B	F	E2	IP
6/28/2011	69C	B	F	E1	IP
6/28/2011	79C	B	W	C1	BP
6/28/2011	98C	B	W	U	IP
6/28/2011	9C	T	P	U	B
6/29/2011	100C	B	F	U	IP
6/29/2011	101C	B	W	U	IP
6/29/2011	102C	B	W	U	IP
6/29/2011	103C	B	F	U	IP
6/29/2011	104C	B	F	U	IP
6/29/2011	105C	T	P	U	BU
6/29/2011	106C	B	F	U	IP
6/29/2011	107C	B	F	U	IP
6/29/2011	108C	B	F	U	IP
6/29/2011	109C	B	F	U	IP
6/29/2011	10C	B	W	U	IP
6/29/2011	11C	B	F	U	IP
6/29/2011	120C	B	F	U	IP
6/29/2011	121C	B	F	U	IP
6/29/2011	122C	B	F	U	IP
6/29/2011	123C	B	F	U	IP
6/29/2011	12C	B	W	U	IP
6/29/2011	13C	B	F	U	IP
6/29/2011	14C	B	W	U	IP
6/29/2011	15C	B	F	U	IP
6/29/2011	16C	B	F	U	IP
6/29/2011	17C	B	F	U	IP
6/29/2011	18C	B	W	E1	IP
6/29/2011	1C	T	P	U	BU

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
6/29/2011	20C	B	F	U	IP
6/29/2011	21C	B	F	E2	IP
6/29/2011	22C	B	F	U	IP
6/29/2011	23C	B	F	E1	IP
6/29/2011	24C	B	W	U	IP
6/29/2011	25C	B	W	U	IP
6/29/2011	26C	B	F	U	IP
6/29/2011	27C	B	F	E1	IP
6/29/2011	28C	B	F	U	IP
6/29/2011	29C	B	W	U	IP
6/29/2011	2C	U	UC	N	NP
6/29/2011	30C	B	W	U	IP
6/29/2011	31C	B	F	U	IP
6/29/2011	32C	B	F	U	IP
6/29/2011	33C	B	W	U	IP
6/29/2011	34C	B	F	U	IP
6/29/2011	35C	B	W	U	IP
6/29/2011	36C	B	F	U	IP
6/29/2011	37C	B	F	E1	IP
6/29/2011	38C	B	W	E1	IP
6/29/2011	39C	B	W	U	IP
6/29/2011	3C	B	F	U	IP
6/29/2011	40C	B	F	U	IP
6/29/2011	41C	B	F	U	IP
6/29/2011	42C	B	F	U	IP
6/29/2011	43C	B	W	U	IP
6/29/2011	44C	B	F	U	IP
6/29/2011	45C	B	W	U	IP
6/29/2011	46C	B	F	U	IP
6/29/2011	47C	B	F	U	IP
6/29/2011	48C	B	F	U	IP
6/29/2011	49C	B	W	U	IP
6/29/2011	4C	B	W	U	IP
6/29/2011	50C	B	W	U	IP
6/29/2011	51C	B	F	E1	IP
6/29/2011	52C	B	W	E1	IP
6/29/2011	53C	B	F	U	IP
6/29/2011	54C	B	F	E1	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
6/29/2011	55C	B	F	U	IP
6/29/2011	56C	B	F	U	IP
6/29/2011	57C	B	F	U	IP
6/29/2011	58C	B	F	U	IP
6/29/2011	59C	B	W	E1	IP
6/29/2011	5C	B	W	U	IP
6/29/2011	60C	B	W	U	IP
6/29/2011	61C	B	W	U	IP
6/29/2011	62C	B	F	U	IP
6/29/2011	63C	B	W	U	IP
6/29/2011	64C	B	W	U	IP
6/29/2011	65C	B	W	U	IP
6/29/2011	66C	B	W	U	IP
6/29/2011	67C	B	W	U	IP
6/29/2011	68C	B	F	E2	IP
6/29/2011	69C	B	W	E2	IP
6/29/2011	6C	B	F	E2	IP
6/29/2011	70C	B	F	U	IP
6/29/2011	71C	B	F	U	IP
6/29/2011	72C	B	F	E1	IP
6/29/2011	73C	B	F	U	IP
6/29/2011	74C	B	F	U	IP
6/29/2011	75C	B	F	U	IP
6/29/2011	76C	B	W	U	IP
6/29/2011	77C	B	F	U	IP
6/29/2011	78C	B	F	U	IP
6/29/2011	79C	B	W	E1	IP
6/29/2011	7C	B	F	U	IP
6/29/2011	80C	B	F	U	IP
6/29/2011	81C	B	F	U	IP
6/29/2011	82C	B	F	U	IP
6/29/2011	83C	B	F	U	IP
6/29/2011	84C	B	F	U	IP
6/29/2011	85C	B	F	U	IP
6/29/2011	86C	B	W	U	IP
6/29/2011	87C	B	F	U	IP
6/29/2011	88C	B	F	U	IP
6/29/2011	89C	T	P	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
6/29/2011	8C	B	F	U	IP
6/29/2011	90C	B	F	U	IP
6/29/2011	91C	B	F	U	IP
6/29/2011	92C	B	F	U	IP
6/29/2011	93C	B	F	U	IP
6/29/2011	94C	B	W	U	IP
6/29/2011	95C	B	F	U	IP
6/29/2011	96C	T	P	U	IP
6/29/2011	98C	B	F	U	IP
6/29/2011	99C	B	F	U	IP
6/29/2011	9C	T	UC	N	B
6/30/2011	100C	B	W	U	IP
6/30/2011	101C	B	F	E1	IP
6/30/2011	102C	B	W	U	IP
6/30/2011	103C	B	F	U	IP
6/30/2011	104C	U	UC	U	IP
6/30/2011	105C	T	P	U	B
6/30/2011	106C	B	F	U	IP
6/30/2011	107C	B	F	U	IP
6/30/2011	108C	B	W	U	IP
6/30/2011	109C	B	F	U	IP
6/30/2011	10C	B	W	U	IP
6/30/2011	110C	U	UC	U	IP
6/30/2011	11C	B	F	U	IP
6/30/2011	120C	B	F	U	IP
6/30/2011	121C	B	W	E1	IP
6/30/2011	122C	B	F	U	IP
6/30/2011	123C	B	F	U	IP
6/30/2011	12C	B	W	E1	IP
6/30/2011	13C	B	W	U	IP
6/30/2011	14C	B	W	E2	IP
6/30/2011	15C	B	F	E1	IP
6/30/2011	16C	B	F	U	IP
6/30/2011	17C	B	F	U	IP
6/30/2011	18C	B	W	U	IP
6/30/2011	19C	B	F	E2	IP
6/30/2011	1C	T	P	N	B
6/30/2011	20C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
6/30/2011	21C	B	W	U	IP
6/30/2011	22C	B	W	U	IP
6/30/2011	23C	B	F	E1	IP
6/30/2011	24C	B	W	U	IP
6/30/2011	25C	B	W	U	IP
6/30/2011	26C	B	W	U	IP
6/30/2011	27C	B	W	E2	IP
6/30/2011	28C	B	F	U	IP
6/30/2011	29C	B	W	U	IP
6/30/2011	2C	T	P	N	NP
6/30/2011	30C	B	W	U	IP
6/30/2011	31C	B	W	U	IP
6/30/2011	32C	B	F	E1	IP
6/30/2011	33C	B	W	U	IP
6/30/2011	34C	U	UC	U	IP
6/30/2011	35C	B	W	U	IP
6/30/2011	36C	B	F	U	IP
6/30/2011	37C	B	F	U	IP
6/30/2011	38C	B	W	U	IP
6/30/2011	39C	B	W	U	IP
6/30/2011	3C	B	F	U	IP
6/30/2011	40C	U	UC	U	IP
6/30/2011	41C	B	F	U	IP
6/30/2011	42C	B	F	U	IP
6/30/2011	43C	B	F	U	IP
6/30/2011	44C	B	F	U	IP
6/30/2011	45C	B	W	U	IP
6/30/2011	46C	B	W	U	IP
6/30/2011	47C	B	E	U	IP
6/30/2011	48C	B	F	U	IP
6/30/2011	49C	B	F	U	IP
6/30/2011	4C	B	W	E1	IP
6/30/2011	50C	B	W	E2	IP
6/30/2011	51C	B	F	U	IP
6/30/2011	52C	B	W	C2	BP
6/30/2011	53C	B	F	U	IP
6/30/2011	54C	B	W	U	IP
6/30/2011	55C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
6/30/2011	56C	B	F	E1	IP
6/30/2011	57C	B	W	U	IP
6/30/2011	58C	B	W	U	IP
6/30/2011	59C	B	F	E1	IP
6/30/2011	5C	B	W	E2	IP
6/30/2011	60C	B	W	E2	IP
6/30/2011	61C	B	W	E1	IP
6/30/2011	61C	B	W	U	IP
6/30/2011	62C	B	W	U	IP
6/30/2011	63C	B	W	U	IP
6/30/2011	64C	B	W	U	IP
6/30/2011	65C	B	W	C2	BP
6/30/2011	66C	B	W	E2	IP
6/30/2011	67C	B	F	U	IP
6/30/2011	68C	B	W	E3	IP
6/30/2011	69C	B	F	E1	IP
6/30/2011	69C	B	F	U	IP
6/30/2011	6C	B	F	E2	IP
6/30/2011	70C	B	F	U	IP
6/30/2011	71C	B	F	U	IP
6/30/2011	72C	B	W	E2	IP
6/30/2011	73C	T	P	U	BU
6/30/2011	74C	B	F	U	IP
6/30/2011	75C	B	F	U	IP
6/30/2011	76C	B	W	U	IP
6/30/2011	77C	B	W	U	IP
6/30/2011	78C	B	F	U	IP
6/30/2011	79C	B	W	U	IP
6/30/2011	7C	B	W	U	IP
6/30/2011	80C	B	F	U	IP
6/30/2011	81C	B	F	U	IP
6/30/2011	82C	B	F	U	IP
6/30/2011	83C	B	F	U	IP
6/30/2011	84C	B	F	E2	IP
6/30/2011	85C	B	W	E2	IP
6/30/2011	86C	B	W	U	IP
6/30/2011	87C	B	W	C1	BP
6/30/2011	88C	B	W	C1	BP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
6/30/2011	89C	B	F	E1	IP
6/30/2011	8C	B	F	U	IP
6/30/2011	90C	B	W	U	IP
6/30/2011	91C	B	F	U	IP
6/30/2011	92C	B	F	U	IP
6/30/2011	93C	B	F	U	IP
6/30/2011	94C	B	W	C1	BP
6/30/2011	95C	B	F	U	IP
6/30/2011	96C	B	F	C1	BP
6/30/2011	98C	B	F	U	IP
6/30/2011	99C	B	F	U	IP
6/30/2011	9C	T	P	N	B
7/1/2011	100C	B	F	U	IP
7/1/2011	101C	B	W	U	IP
7/1/2011	105C	U	UC	N	NP
7/1/2011	107C	B	F	U	IP
7/1/2011	108C	B	W	U	IP
7/1/2011	109C	B	F	U	IP
7/1/2011	10C	B	W	E1	IP
7/1/2011	110C	B	F	U	IP
7/1/2011	111C	B	F	U	IP
7/1/2011	11C	B	F	U	IP
7/1/2011	120C	B	F	U	IP
7/1/2011	121C	B	W	E2	IP
7/1/2011	122C	B	F	E1	IP
7/1/2011	123C	B	F	U	IP
7/1/2011	12C	B	W	U	IP
7/1/2011	13C	B	W	U	IP
7/1/2011	14C	B	W	E1	IP
7/1/2011	15C	B	F	U	IP
7/1/2011	16C	B	F	U	IP
7/1/2011	18C	B	W	U	IP
7/1/2011	19C	B	W	E2	IP
7/1/2011	1C	T	P	N	NP
7/1/2011	20C	B	W	E1	IP
7/1/2011	21C	B	W	E1	IP
7/1/2011	22C	B	F	U	IP
7/1/2011	23C	B	F	E1	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/1/2011	23C	B	F	U	IP
7/1/2011	24C	B	W	U	IP
7/1/2011	25C	B	W	U	IP
7/1/2011	26C	B	F	U	IP
7/1/2011	27C	B	W	E2	IP
7/1/2011	28C	B	F	U	IP
7/1/2011	29C	B	F	U	IP
7/1/2011	2C	T	P	N	B
7/1/2011	30C	B	W	U	IP
7/1/2011	31C	B	W	E2	IP
7/1/2011	32C	B	W	U	IP
7/1/2011	33C	B	W	U	IP
7/1/2011	34C	U	UC	U	IP
7/1/2011	35C	B	W	U	IP
7/1/2011	36C	B	F	U	IP
7/1/2011	37C	B	F	U	IP
7/1/2011	38C	B	F	U	IP
7/1/2011	39C	B	F	U	IP
7/1/2011	3C	B	F	E3	IP
7/1/2011	40C	B	F	U	IP
7/1/2011	41C	B	F	U	IP
7/1/2011	42C	B	F	U	IP
7/1/2011	43C	B	W	U	IP
7/1/2011	44C	B	F	U	IP
7/1/2011	45C	B	W	U	IP
7/1/2011	46C	B	W	U	IP
7/1/2011	47C	B	W	U	IP
7/1/2011	48C	B	F	U	IP
7/1/2011	49C	B	F	U	IP
7/1/2011	4C	B	W	U	IP
7/1/2011	53C	B	F	U	IP
7/1/2011	59C	B	W	E1	IP
7/1/2011	5C	B	W	E2	IP
7/1/2011	6C	B	F	U	IP
7/1/2011	71C	B	F	U	IP
7/1/2011	72C	B	F	U	IP
7/1/2011	73C	B	F	U	IP
7/1/2011	74C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/1/2011	75C	B	F	U	IP
7/1/2011	76C	B	W	U	IP
7/1/2011	77C	B	W	U	IP
7/1/2011	78C	B	F	U	IP
7/1/2011	79C	B	W	C2	BP
7/1/2011	7C	B	F	U	IP
7/1/2011	80C	B	W	U	IP
7/1/2011	81C	B	W	U	IP
7/1/2011	82C	B	W	C1	BP
7/1/2011	83C	B	F	U	IP
7/1/2011	84C	B	F	U	IP
7/1/2011	85C	B	W	E2	IP
7/1/2011	87C	B	W	C1	BP
7/1/2011	89C	B	W	E2	IP
7/1/2011	8C	T	P	N	B
7/1/2011	8C	B	F	U	IP
7/1/2011	90C	B	W	U	IP
7/1/2011	91C	B	F	U	IP
7/1/2011	92C	B	F	U	IP
7/1/2011	93C	B	F	U	IP
7/1/2011	94C	B	W	U	IP
7/1/2011	95C	B	F	U	IP
7/1/2011	96C	B	F	U	IP
7/1/2011	98C	B	F	U	IP
7/1/2011	99C	B	F	U	IP
7/2/2011	100C	B	W	U	IP
7/2/2011	101C	B	W	U	IP
7/2/2011	102C	B	W	E1	IP
7/2/2011	103C	B	F	U	IP
7/2/2011	104C	B	F	U	IP
7/2/2011	105C	T	UC	N	B
7/2/2011	106C	T	P	U	IP
7/2/2011	107C	B	F	U	IP
7/2/2011	10C	B	W	U	IP
7/2/2011	111C	B	W	U	IP
7/2/2011	11C	B	W	U	IP
7/2/2011	120C	B	F	U	IP
7/2/2011	121C	B	W	E1	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/2/2011	122C	B	F	U	IP
7/2/2011	12C	B	W	E2	IP
7/2/2011	13C	B	W	C1	BP
7/2/2011	14C	B	W	E1	IP
7/2/2011	15C	B	F	U	IP
7/2/2011	16C	B	F	U	IP
7/2/2011	17C	B	W	U	IP
7/2/2011	18C	B	W	E1	IP
7/2/2011	19C	B	F	U	IP
7/2/2011	1C	T	UC	N	B
7/2/2011	20C	B	W	U	IP
7/2/2011	21C	B	W	E1	IP
7/2/2011	22C	B	W	U	IP
7/2/2011	23C	B	W	E1	IP
7/2/2011	24C	B	W	E2	IP
7/2/2011	25C	B	W	U	IP
7/2/2011	26C	B	F	U	IP
7/2/2011	27C	B	W	E1	IP
7/2/2011	28C	B	F	E1	IP
7/2/2011	29C	B	F	U	IP
7/2/2011	2C	T	UC	N	B
7/2/2011	30C	B	W	U	IP
7/2/2011	31C	B	W	E1	IP
7/2/2011	32C	B	W	U	IP
7/2/2011	33C	B	W	U	IP
7/2/2011	34C	U	UC	U	IP
7/2/2011	35C	B	W	E1	IP
7/2/2011	36C	B	W	U	IP
7/2/2011	37C	B	W	U	IP
7/2/2011	38C	B	W	U	IP
7/2/2011	39C	B	W	U	IP
7/2/2011	3C	B	F	E1	IP
7/2/2011	40C	B	UC	C1	BP
7/2/2011	41C	U	UC	U	IP
7/2/2011	42C	B	F	E1	IP
7/2/2011	43C	B	W	U	IP
7/2/2011	44C	B	F	E1	IP
7/2/2011	45C	B	W	U	BP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/2/2011	46C	B	W	U	IP
7/2/2011	47C	B	W	U	IP
7/2/2011	48C	B	F	U	IP
7/2/2011	49C	B	W	U	IP
7/2/2011	4C	B	W	E2	IP
7/2/2011	50C	B	W	E2	IP
7/2/2011	51C	B	F	U	IP
7/2/2011	52C	B	W	C1	BP
7/2/2011	53C	B	F	U	IP
7/2/2011	54C	B	W	U	IP
7/2/2011	55C	B	W	C2	BP
7/2/2011	56C	B	W	U	IP
7/2/2011	57C	B	W	U	IP
7/2/2011	58C	B	W	U	IP
7/2/2011	59C	B	W	E2	IP
7/2/2011	5C	B	W	U	IP
7/2/2011	60C	B	W	U	IP
7/2/2011	61C	B	W	U	IP
7/2/2011	62C	B	W	U	IP
7/2/2011	63C	B	W	U	IP
7/2/2011	64C	B	W	E2	IP
7/2/2011	65C	B	W	C3	BP
7/2/2011	66C	B	W	U	IP
7/2/2011	67C	B	F	U	IP
7/2/2011	68C	B	F	U	IP
7/2/2011	69C	B	F	U	IP
7/2/2011	6C	B	F	U	IP
7/2/2011	70C	B	F	U	IP
7/2/2011	71C	B	F	U	IP
7/2/2011	72C	B	W	U	IP
7/2/2011	73C	B	F	U	BU
7/2/2011	74C	B	W	U	IP
7/2/2011	75C	B	W	U	IP
7/2/2011	76C	B	W	U	IP
7/2/2011	77C	B	W	U	IP
7/2/2011	78C	B	F	U	IP
7/2/2011	79C	B	W	C2	BP
7/2/2011	7C	B	F	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/2/2011	80C	B	W	U	IP
7/2/2011	81C	B	W	C1	BP
7/2/2011	84C	B	F	U	IP
7/2/2011	85C	B	W	E1	IP
7/2/2011	86C	B	W	U	IP
7/2/2011	98C	B	F	U	BU
7/2/2011	99C	B	F	U	IP
7/2/2011	9C	T	UC	N	B
7/3/2011	100C	B	F	U	IP
7/3/2011	101C	B	W	U	IP
7/3/2011	102C	B	W	U	IP
7/3/2011	104C	B	F	U	IP
7/3/2011	105C	T	UC	N	B
7/3/2011	106C	B	F	U	IP
7/3/2011	107C	B	W	U	IP
7/3/2011	108C	B	F	U	IP
7/3/2011	109C	B	F	U	IP
7/3/2011	10C	B	W	E1	IP
7/3/2011	110C	B	W	U	IP
7/3/2011	111C	B	F	U	IP
7/3/2011	11C	B	W	U	IP
7/3/2011	120C	B	F	E1	IP
7/3/2011	121C	B	W	E1	IP
7/3/2011	122C	B	F	U	IP
7/3/2011	123C	B	F	U	IP
7/3/2011	12C	B	W	E1	IP
7/3/2011	13C	B	W	U	IP
7/3/2011	14C	B	W	U	IP
7/3/2011	15C	B	W	U	IP
7/3/2011	16C	B	W	U	IP
7/3/2011	17C	B	W	U	IP
7/3/2011	18C	B	W	U	IP
7/3/2011	19C	B	F	U	IP
7/3/2011	1C	T	P	N	NP
7/3/2011	20C	B	W	U	IP
7/3/2011	21C	B	W	U	IP
7/3/2011	22C	B	W	U	IP
7/3/2011	23C	B	W	E2	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/3/2011	24C	B	W	E2	IP
7/3/2011	25C	B	W	U	IP
7/3/2011	26C	B	F	U	IP
7/3/2011	27C	B	W	E1	IP
7/3/2011	28C	B	F	U	IP
7/3/2011	29C	B	W	U	IP
7/3/2011	2C	T	P	N	NP
7/3/2011	30C	B	W	U	IP
7/3/2011	31C	B	W	E1	IP
7/3/2011	32C	B	F	U	IP
7/3/2011	33C	B	W	U	IP
7/3/2011	34C	B	F	U	IP
7/3/2011	35C	B	W	U	IP
7/3/2011	36C	B	F	U	IP
7/3/2011	37C	B	F	U	IP
7/3/2011	38C	B	W	U	IP
7/3/2011	39C	B	W	U	IP
7/3/2011	3C	B	F	U	IP
7/3/2011	40C	B	W	U	IP
7/3/2011	41C	B	W	U	IP
7/3/2011	42C	B	W	E1	IP
7/3/2011	43C	B	W	U	IP
7/3/2011	44C	B	W	U	IP
7/3/2011	45C	B	W	U	IP
7/3/2011	46C	B	W	U	IP
7/3/2011	47C	B	W	U	IP
7/3/2011	48C	B	F	E1	IP
7/3/2011	48C	B	W	U	IP
7/3/2011	49C	B	W	U	IP
7/3/2011	4C	B	W	U	IP
7/3/2011	50C	B	W	E1	IP
7/3/2011	51C	B	F	E1	IP
7/3/2011	52C	B	W	C2	BP
7/3/2011	53C	B	W	U	IP
7/3/2011	54C	B	F	E1	IP
7/3/2011	55C	B	W	C1	BP
7/3/2011	56C	B	W	E1	IP
7/3/2011	57C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/3/2011	58C	B	W	U	IP
7/3/2011	59C	B	W	E1	IP
7/3/2011	5C	B	W	E2	IP
7/3/2011	60C	B	W	U	IP
7/3/2011	61C	B	W	U	IP
7/3/2011	62C	B	W	U	IP
7/3/2011	65C	B	W	C2	BP
7/3/2011	66C	FAILED	P	N	B
7/3/2011	67C	B	W	E1	IP
7/3/2011	68C	B	F	U	IP
7/3/2011	69C	B	W	E1	IP
7/3/2011	6C	B	W	E1	IP
7/3/2011	70C	B	F	U	IP
7/3/2011	71C	B	W	U	IP
7/3/2011	72C	B	W	U	IP
7/3/2011	73C	B	F	U	IP
7/3/2011	74C	B	F	U	IP
7/3/2011	75C	B	F	U	IP
7/3/2011	76C	B	W	E1	IP
7/3/2011	77C	B	W	U	IP
7/3/2011	78C	B	W	U	IP
7/3/2011	79C	B	W	C2	BC
7/3/2011	7C	B	F	U	IP
7/3/2011	80C	B	W	U	IP
7/3/2011	81C	B	W	C1	BC
7/3/2011	82C	B	F	U	IP
7/3/2011	83C	B	F	C1	BP
7/3/2011	84C	B	F	U	IP
7/3/2011	85C	B	W	E2	IP
7/3/2011	86C	B	W	U	IP
7/3/2011	87C	B	W	C2	BP
7/3/2011	88C	B	W	C2	BP
7/3/2011	89C	B	F	E1	IP
7/3/2011	8C	B	W	U	IP
7/3/2011	90C	B	W	U	IP
7/3/2011	91C	B	F	U	IP
7/3/2011	92C	B	F	U	IP
7/3/2011	93C	B	F	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/3/2011	94C	B	W	C2	BP
7/3/2011	95C	B	F	U	IP
7/3/2011	96C	B	W	C1	BP
7/3/2011	98C	B	W	U	IP
7/3/2011	99C	B	W	E1	IP
7/3/2011	9C	T	P	N	NP
7/4/2011	100C	B	W	C1	BP
7/4/2011	101C	B	W	U	IP
7/4/2011	102C	B	W	U	IP
7/4/2011	103C	B	W	U	IP
7/4/2011	104C	B	F	U	IP
7/4/2011	105C	T	UC	N	B
7/4/2011	106C	B	W	U	IP
7/4/2011	107C	FAILED	UC	U	BU
7/4/2011	108C	B	W	U	IP
7/4/2011	109C	B	W	U	IP
7/4/2011	10C	B	W	U	IP
7/4/2011	110C	B	W	U	IP
7/4/2011	111C	B	W	U	IP
7/4/2011	11C	B	W	U	IP
7/4/2011	120C	B	P	E1	IP
7/4/2011	121C	B	W	U	IP
7/4/2011	122C	B	W	U	IP
7/4/2011	123C	B	W	U	IP
7/4/2011	12C	B	W	E1	IP
7/4/2011	13C	B	W	C1	BP
7/4/2011	14C	B	W	U	IP
7/4/2011	15C	B	W	U	IP
7/4/2011	16C	B	F	U	IP
7/4/2011	17C	B	F	U	IP
7/4/2011	18C	B	W	U	IP
7/4/2011	19C	B	W	E1	IP
7/4/2011	1C	T	UC	N	NP
7/4/2011	20C	B	W	U	IP
7/4/2011	21C	B	W	U	IP
7/4/2011	22C	B	W	U	IP
7/4/2011	23C	B	W	U	IP
7/4/2011	24C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/4/2011	24C	B	W	U	IP
7/4/2011	25C	B	W	U	IP
7/4/2011	26C	B	F	C1	BC
7/4/2011	27C	B	W	U	IP
7/4/2011	28C	B	W	U	IP
7/4/2011	29C	B	W	U	IP
7/4/2011	2C	T	UC	N	NP
7/4/2011	30C	B	W	U	IP
7/4/2011	31C	B	W	U	IP
7/4/2011	32C	B	W	U	IP
7/4/2011	33C	B	W	U	IP
7/4/2011	35C	B	W	U	IP
7/4/2011	36C	B	W	U	IP
7/4/2011	37C	B	W	U	IP
7/4/2011	38C	B	W	U	IP
7/4/2011	39C	B	W	U	IP
7/4/2011	3C	B	W	U	IP
7/4/2011	40C	B	W	U	IP
7/4/2011	41C	B	W	U	IP
7/4/2011	42C	B	W	U	IP
7/4/2011	43C	B	W	U	IP
7/4/2011	44C	B	W	U	IP
7/4/2011	45C	B	W	U	IP
7/4/2011	46C	B	W	U	IP
7/4/2011	47C	B	W	U	IP
7/4/2011	48C	B	W	U	IP
7/4/2011	49C	B	W	U	IP
7/4/2011	4C	B	W	U	IP
7/4/2011	50C	B	W	E1	IP
7/4/2011	51C	B	F	U	IP
7/4/2011	52C	B	W	C2	BP
7/4/2011	53C	B	W	U	IP
7/4/2011	54C	B	W	U	IP
7/4/2011	55C	B	W	C3	BP
7/4/2011	56C	B	W	U	IP
7/4/2011	57C	B	W	U	IP
7/4/2011	58C	B	W	U	IP
7/4/2011	59C	B	W	E1	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/4/2011	5C	B	W	E1	IP
7/4/2011	60C	B	W	U	IP
7/4/2011	61C	B	W	U	IP
7/4/2011	62C	B	W	U	IP
7/4/2011	63C	B	W	U	IP
7/4/2011	64C	B	W	U	IP
7/4/2011	65C	B	W	C2	BP
7/4/2011	66C	T	UC	N	B
7/4/2011	67C	B	W	U	IP
7/4/2011	68C	B	F	E1	IP
7/4/2011	69C	B	W	U	IP
7/4/2011	6C	B	W	U	IP
7/4/2011	70C	B	W	U	IP
7/4/2011	71C	B	W	U	IP
7/4/2011	72C	B	W	E1	IP
7/4/2011	73C	B	W	U	IP
7/4/2011	74C	FAILED	F	UC	NP
7/4/2011	75C	B	W	U	IP
7/4/2011	76C	B	W	U	IP
7/4/2011	77C	B	W	U	IP
7/4/2011	78C	B	W	U	IP
7/4/2011	79C	B	W	U	IP
7/4/2011	7C	B	W	U	IP
7/4/2011	80C	B	W	U	IP
7/4/2011	81C	B	W	U	IP
7/4/2011	82C	B	F	U	IP
7/4/2011	83C	B	F	U	IP
7/4/2011	84C	B	F	U	IP
7/4/2011	85C	B	W	U	IP
7/4/2011	86C	B	W	U	IP
7/4/2011	87C	B	W	C2	BP
7/4/2011	88C	B	F	E2	IP
7/4/2011	89C	B	F	U	IP
7/4/2011	8C	B	W	U	IP
7/4/2011	90C	B	W	U	IP
7/4/2011	91C	B	W	U	IP
7/4/2011	92C	B	W	U	IP
7/4/2011	93C	B	F	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/4/2011	94C	B	W	C1	BP
7/4/2011	95C	B	F	U	IP
7/4/2011	96C	B	W	C1	BP
7/4/2011	98C	B	W	U	IP
7/4/2011	99C	B	W	U	IP
7/4/2011	9C	T	P	N	NP
7/5/2011	100C	B	W	C3	BP
7/5/2011	105C	T	UC	N	B
7/5/2011	106C	B	F	U	IP
7/5/2011	107C	B	F	U	BU
7/5/2011	108C	B	F	U	IP
7/5/2011	109C	B	W	U	IP
7/5/2011	10C	B	W	U	IP
7/5/2011	111C	B	W	U	IP
7/5/2011	11C	B	W	U	IP
7/5/2011	120C	B	F	U	IP
7/5/2011	121C	B	F	U	IP
7/5/2011	123C	B	F	U	IP
7/5/2011	12C	B	W	U	IP
7/5/2011	13C	B	W	U	IP
7/5/2011	14C	B	W	U	IP
7/5/2011	15C	B	W	U	IP
7/5/2011	16C	B	W	U	IP
7/5/2011	17C	B	W	U	IP
7/5/2011	18C	B	W	U	IP
7/5/2011	1C	T	UC	N	NP
7/5/2011	2C	T	UC	N	NP
7/5/2011	3C	B	W	U	IP
7/5/2011	4C	B	W	U	IP
7/5/2011	5C	B	W	E2	IP
7/5/2011	6C	B	W	U	IP
7/5/2011	71C	B	W	U	IP
7/5/2011	72C	B	W	U	IP
7/5/2011	73C	B	F	U	IP
7/5/2011	74C	B	F	U	IP
7/5/2011	75C	B	F	U	IP
7/5/2011	76C	B	W	U	IP
7/5/2011	77C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/5/2011	78C	B	W	U	IP
7/5/2011	79C	B	W	U	IP
7/5/2011	80C	B	W	U	IP
7/5/2011	81C	B	W	U	IP
7/5/2011	83C	B	F	C1	BP
7/5/2011	83C	B	F	U	IP
7/5/2011	87C	B	W	C2	BP
7/5/2011	88C	B	W	C1	BP
7/5/2011	89C	B	F	U	IP
7/5/2011	8C	B	W	U	IP
7/5/2011	90C	B	F	U	IP
7/5/2011	91C	B	W	U	IP
7/5/2011	92C	B	W	U	IP
7/5/2011	93C	B	F	U	IP
7/5/2011	94C	B	W	C1	BP
7/5/2011	95C	B	F	U	IP
7/5/2011	96C	B	F	C1	BP
7/5/2011	98C	B	W	U	IP
7/5/2011	99C	B	W	U	IP
7/5/2011	9C	T	UC	N	NP
7/6/2011	100C	B	W	U	IP
7/6/2011	107C	U	UC	U	U
7/6/2011	108C	B	W	U	IP
7/6/2011	109C	B	W	U	IP
7/6/2011	10C	B	W	U	IP
7/6/2011	111C	B	W	U	IP
7/6/2011	11C	B	W	U	IP
7/6/2011	120C	B	W	U	IP
7/6/2011	121C	B	W	U	IP
7/6/2011	122C	B	W	U	IP
7/6/2011	123C	B	W	U	IP
7/6/2011	12C	B	W	U	IP
7/6/2011	13C	B	F	U	IP
7/6/2011	14C	B	W	U	IP
7/6/2011	15C	B	W	U	IP
7/6/2011	16C	B	W	U	IP
7/6/2011	17C	B	W	U	IP
7/6/2011	18C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/6/2011	19C	B	F	U	IP
7/6/2011	1C	T	UC	N	B
7/6/2011	20C	B	W	U	IP
7/6/2011	21C	B	W	U	IP
7/6/2011	22C	B	W	U	IP
7/6/2011	23C	B	W	U	IP
7/6/2011	2C	T	UC	N	B
7/6/2011	3C	B	W	U	IP
7/6/2011	4C	B	W	U	IP
7/6/2011	5C	B	W	U	IP
7/6/2011	6C	B	W	U	IP
7/6/2011	76C	B	W	U	IP
7/6/2011	77C	B	W	U	IP
7/6/2011	78C	B	W	U	IP
7/6/2011	79C	B	W	U	IP
7/6/2011	7C	B	W	U	IP
7/6/2011	80C	B	W	U	IP
7/6/2011	81C	B	W	U	IP
7/6/2011	82C	B	W	U	IP
7/6/2011	83C	B	W	U	IP
7/6/2011	84C	B	W	U	IP
7/6/2011	87C	B	W	U	IP
7/6/2011	88C	B	W	U	BU
7/6/2011	89C	B	W	U	IP
7/6/2011	90C	B	W	U	IP
7/6/2011	91C	B	W	U	IP
7/6/2011	92C	B	W	U	IP
7/6/2011	93C	B	W	U	IP
7/6/2011	94C	B	W	U	IP
7/6/2011	95C	B	W	U	IP
7/6/2011	96C	B	W	U	IP
7/6/2011	9C	T	P	N	B
7/7/2011	100C	B	W	C2	BP
7/7/2011	101C	B	W	U	IP
7/7/2011	103C	B	W	U	IP
7/7/2011	104C	B	W	U	IP
7/7/2011	105C	T	P	N	B

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/7/2011	106C	B	F	U	IP
7/7/2011	107C	T	UC	N	NP
7/7/2011	108C	B	W	U	IP
7/7/2011	109C	B	W	U	IP
7/7/2011	10C	B	W	U	IP
7/7/2011	110C	B	W	U	IP
7/7/2011	111C	B	W	U	IP
7/7/2011	11C	B	W	U	IP
7/7/2011	120C	B	W	U	IP
7/7/2011	121C	B	W	U	IP
7/7/2011	12C	B	W	U	IP
7/7/2011	19C	B	W	U	IP
7/7/2011	1C	T	UC	N	NP
7/7/2011	20C	B	W	U	IP
7/7/2011	21C	B	W	U	IP
7/7/2011	22C	B	W	U	IP
7/7/2011	23C	B	W	E1	IP
7/7/2011	24C	B	W	U	IP
7/7/2011	25C	B	W	U	IP
7/7/2011	26C	B	W	U	IP
7/7/2011	27C	B	W	U	IP
7/7/2011	28C	B	W	U	IP
7/7/2011	29C	B	W	U	IP
7/7/2011	2C	T	UC	N	NP
7/7/2011	30C	B	W	U	IP
7/7/2011	31C	B	W	U	IP
7/7/2011	32C	B	W	U	IP
7/7/2011	33C	B	W	U	IP
7/7/2011	34C	B	F	U	IP
7/7/2011	35C	B	W	U	IP
7/7/2011	36C	B	W	U	IP
7/7/2011	37C	B	W	U	IP
7/7/2011	38C	B	W	U	IP
7/7/2011	39C	B	W	U	IP
7/7/2011	3C	B	W	U	IP
7/7/2011	40C	U	UC	U	IP
7/7/2011	41C	B	F	U	IP
7/7/2011	42C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/7/2011	43C	B	W	U	IP
7/7/2011	44C	B	W	U	IP
7/7/2011	45C	B	W	U	IP
7/7/2011	46C	B	W	U	IP
7/7/2011	47C	B	W	U	IP
7/7/2011	48C	B	W	U	IP
7/7/2011	49C	B	W	U	IP
7/7/2011	4C	B	W	U	IP
7/7/2011	50C	B	W	U	IP
7/7/2011	51C	B	F	U	IP
7/7/2011	52C	B	W	C2	BP
7/7/2011	53C	B	W	U	IP
7/7/2011	54C	B	W	U	IP
7/7/2011	55C	B	W	U	IP
7/7/2011	56C	B	W	U	IP
7/7/2011	57C	B	W	U	IP
7/7/2011	58C	B	W	E1	IP
7/7/2011	59C	B	W	U	IP
7/7/2011	5C	B	W	U	IP
7/7/2011	61C	B	W	U	IP
7/7/2011	62C	B	W	E1	IP
7/7/2011	62C	B	W	U	IP
7/7/2011	63C	B	W	U	IP
7/7/2011	64C	B	W	U	IP
7/7/2011	65C	B	W	C2	BP
7/7/2011	66C	T	UC	N	B
7/7/2011	67C	B	W	U	IP
7/7/2011	68C	B	W	U	IP
7/7/2011	69C	B	W	U	IP
7/7/2011	6C	B	W	U	IP
7/7/2011	70C	B	W	U	IP
7/7/2011	71C	B	F	U	IP
7/7/2011	72C	B	W	U	IP
7/7/2011	73C	B	F	U	IP
7/7/2011	74C	FAILED	UC	N	NP
7/7/2011	75C	B	F	U	IP
7/7/2011	76C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/7/2011	77C	B	W	U	IP
7/7/2011	78C	B	W	U	IP
7/7/2011	79C	B	W	U	IP
7/7/2011	7C	B	W	U	IP
7/7/2011	80C	B	W	U	IP
7/7/2011	81C	B	W	U	IP
7/7/2011	82C	B	F	U	IP
7/7/2011	83C	B	F	U	IP
7/7/2011	84C	B	F	U	IP
7/7/2011	85C	B	W	U	IP
7/7/2011	86C	B	W	U	IP
7/7/2011	87C	B	W	C1	BP
7/7/2011	88C	B	F	U	IP
7/7/2011	89C	B	F	U	IP
7/7/2011	8C	B	W	U	IP
7/7/2011	90C	B	W	U	IP
7/7/2011	91C	B	W	U	IP
7/7/2011	92C	B	W	U	IP
7/7/2011	93C	B	W	U	IP
7/7/2011	94C	B	W	C1	BP
7/7/2011	95C	B	W	U	IP
7/7/2011	96C	B	W	C1	BP
7/7/2011	98C	B	W	U	IP
7/7/2011	99C	B	W	U	IP
7/7/2011	9C	T	UC	N	NP
7/8/2011	100C	B	W	C2	BC
7/8/2011	101C	B	W	U	IP
7/8/2011	103C	B	W	U	IP
7/8/2011	104C	B	F	U	IP
7/8/2011	105C	T	P	N	B
7/8/2011	106C	B	F	U	IP
7/8/2011	108C	B	W	U	IP
7/8/2011	109C	B	W	U	IP
7/8/2011	10C	B	W	U	IP
7/8/2011	110C	B	W	U	IP
7/8/2011	111C	B	W	U	IP
7/8/2011	11C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/8/2011	120C	B	W	U	IP
7/8/2011	121C	B	W	U	IP
7/8/2011	122C	B	F	U	IP
7/8/2011	122C	B	W	U	IP
7/8/2011	12C	B	W	U	IP
7/8/2011	13C	B	W	C1	BP
7/8/2011	14C	B	W	U	IP
7/8/2011	15C	B	W	U	IP
7/8/2011	16C	B	W	U	IP
7/8/2011	17C	B	W	U	IP
7/8/2011	18C	B	W	U	IP
7/8/2011	19C	B	W	U	IP
7/8/2011	1C	T	P	N	B
7/8/2011	20C	B	W	U	IP
7/8/2011	21C	B	W	U	IP
7/8/2011	22C	B	W	U	IP
7/8/2011	23C	B	W	U	IP
7/8/2011	24C	B	W	U	IP
7/8/2011	25C	B	W	U	IP
7/8/2011	26C	B	W	U	IP
7/8/2011	27C	B	W	U	IP
7/8/2011	28C	B	W	U	IP
7/8/2011	29C	B	W	U	IP
7/8/2011	2C	T	UC	N	B
7/8/2011	30C	B	W	U	IP
7/8/2011	31C	B	W	U	IP
7/8/2011	32C	B	W	U	IP
7/8/2011	33C	B	W	U	IP
7/8/2011	34C	B	F	U	IP
7/8/2011	35C	B	W	U	IP
7/8/2011	36C	B	W	U	IP
7/8/2011	37C	B	W	U	IP
7/8/2011	38C	B	W	U	IP
7/8/2011	39C	B	W	U	IP
7/8/2011	3C	B	W	U	IP
7/8/2011	40C	B	W	U	IP
7/8/2011	41C	B	W	U	IP
7/8/2011	42C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/8/2011	43C	B	W	U	IP
7/8/2011	44C	B	W	U	IP
7/8/2011	45C	B	W	U	IP
7/8/2011	46C	B	W	U	IP
7/8/2011	47C	B	W	U	IP
7/8/2011	48C	B	W	U	IP
7/8/2011	49C	B	W	U	IP
7/8/2011	4C	B	W	U	IP
7/8/2011	50C	B	W	E1	IP
7/8/2011	51C	B	F	U	IP
7/8/2011	52C	B	W	C2, E1?	BP
7/8/2011	53C	B	W	U	IP
7/8/2011	54C	B	W	U	IP
7/8/2011	55C	B	W	C1	BP
7/8/2011	56C	B	W	U	IP
7/8/2011	57C	B	W	U	IP
7/8/2011	58C	B	W	U	IP
7/8/2011	59C	B	W	U	IP
7/8/2011	5C	B	W	U	IP
7/8/2011	61C	B	W	U	IP
7/8/2011	62C	B	W	U	IP
7/8/2011	63C	B	W	U	IP
7/8/2011	64C	B	W	U	IP
7/8/2011	65C	B	W	C1	BC
7/8/2011	66C	T	P	N	B
7/8/2011	67C	B	W	U	IP
7/8/2011	68C	B	F	U	IP
7/8/2011	69C	B	W	E1	IP
7/8/2011	6C	B	W	E1	IP
7/8/2011	70C	B	W	U	IP
7/8/2011	71C	B	W	U	IP
7/8/2011	72C	B	W	U	IP
7/8/2011	73C	B	F	U	IP
7/8/2011	74C	T	P	N	B
7/8/2011	75C	B	F	U	IP
7/8/2011	76C	B	W	U	IP
7/8/2011	77C	B	W	U	IP
7/8/2011	78C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/8/2011	79C	B	W	U	IP
7/8/2011	7C	B	W	U	IP
7/8/2011	80C	B	W	C1	BP
7/8/2011	81C	B	W	U	IP
7/8/2011	82C	B	W	U	IP
7/8/2011	83C	B	W	C1	BP
7/8/2011	84C	B	W	U	IP
7/8/2011	85C	B	W	U	IP
7/8/2011	86C	B	W	U	IP
7/8/2011	87C	B	W	C2	BC
7/8/2011	88C	B	F	C1	BC
7/8/2011	89C	B	F	U	IP
7/8/2011	8C	FAILED	P	U	BU
7/8/2011	90C	B	W	U	IP
7/8/2011	91C	B	W	U	IP
7/8/2011	92C	B	W	U	IP
7/8/2011	93C	B	W	U	IP
7/8/2011	94C	B	F	C2	BC
7/8/2011	95C	B	W	U	IP
7/8/2011	96C	B	F	C1	BC
7/8/2011	98C	B	F	U	IP
7/8/2011	99C	B	W	U	IP
7/8/2011	9C	T	P	N	B
7/9/2011	100C	B	W	C2	BC
7/9/2011	101C	B	W	U	IP
7/9/2011	103C	B	W	U	IP
7/9/2011	104C	B	W	U	BP
7/9/2011	105C	T	P	N	B
7/9/2011	106C	B	W	U	IP
7/9/2011	108C	B	W	U	IP
7/9/2011	109C	B	W	U	IP
7/9/2011	10C	B	W	E1	IP
7/9/2011	110C	B	W	U	IP
7/9/2011	111C	B	W	U	IP
7/9/2011	112C	B	UC	C1	BC
7/9/2011	11C	B	W	U	IP
7/9/2011	120C	B	W	U	IP
7/9/2011	121C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/9/2011	122C	B	W	U	IP
7/9/2011	123C	B	W	U	IP
7/9/2011	12C	B	W	U	IP
7/9/2011	15C	B	W	U	IP
7/9/2011	16C	B	W	U	IP
7/9/2011	17C	B	W	U	IP
7/9/2011	18C	B	W	U	IP
7/9/2011	19C	B	W	U	IP
7/9/2011	1C	T	P	N	B
7/9/2011	20C	B	W	U	IP
7/9/2011	21C	B	W	U	IP
7/9/2011	22C	B	W	U	IP
7/9/2011	24C	B	W	U	IP
7/9/2011	25C	B	W	U	IP
7/9/2011	26C	B	W	U	IP
7/9/2011	27C	B	W	U	IP
7/9/2011	28C	B	W	U	IP
7/9/2011	29C	B	W	U	IP
7/9/2011	2C	T	P	N	B
7/9/2011	30C	B	W	U	IP
7/9/2011	31C	B	W	U	IP
7/9/2011	32C	B	W	U	IP
7/9/2011	33C	B	W	U	IP
7/9/2011	34C	B	W	U	IP
7/9/2011	35C	B	W	E1	IP
7/9/2011	36C	B	W	U	IP
7/9/2011	37C	B	W	U	IP
7/9/2011	38C	B	W	U	IP
7/9/2011	39C	B	W	U	IP
7/9/2011	3C	B	W	U	IP
7/9/2011	40C	B	W	U	IP
7/9/2011	41C	B	W	U	IP
7/9/2011	42C	B	W	U	IP
7/9/2011	43C	B	W	U	IP
7/9/2011	44C	B	W	U	IP
7/9/2011	45C	B	W	U	IP
7/9/2011	46C	B	W	U	IP
7/9/2011	47C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/9/2011	48C	B	W	U	IP
7/9/2011	49C	B	W	U	IP
7/9/2011	4C	B	W	U	IP
7/9/2011	50C	B	W	U	IP
7/9/2011	51C	B	F	U	IP
7/9/2011	52C	B	W	C1	BP
7/9/2011	53C	B	W	U	IP
7/9/2011	54C	B	W	U	IP
7/9/2011	55C	B	W	C1	BP
7/9/2011	56C	B	W	U	IP
7/9/2011	57C	B	W	U	IP
7/9/2011	58C	B	W	U	IP
7/9/2011	59C	B	W	U	IP
7/9/2011	5C	B	W	U	IP
7/9/2011	61C	B	W	U	IP
7/9/2011	62C	B	W	U	IP
7/9/2011	63C	B	W	U	IP
7/9/2011	64C	B	W	U	IP
7/9/2011	65C	B	W	C2	BC
7/9/2011	66C	T	P	N	B
7/9/2011	67C	B	W	U	IP
7/9/2011	68C	B	W	U	IP
7/9/2011	69C	B	W	U	IP
7/9/2011	6C	B	W	U	IP
7/9/2011	70C	B	W	U	BP
7/9/2011	71C	B	W	U	IP
7/9/2011	72C	B	W	U	IP
7/9/2011	73C	B	W	U	IP
7/9/2011	75C	B	W	U	IP
7/9/2011	76C	B	W	U	IP
7/9/2011	77C	B	W	U	IP
7/9/2011	78C	B	W	U	IP
7/9/2011	79C	B	W	U	IP
7/9/2011	7C	B	W	U	IP
7/9/2011	80C	B	W	C1	BP
7/9/2011	81C	B	W	U	IP
7/9/2011	82C	B	W	U	IP
7/9/2011	83C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/9/2011	84C	B	W	C1	BP
7/9/2011	85C	B	W	U	IP
7/9/2011	86C	B	W	U	IP
7/9/2011	87C	B	W	C1	BP
7/9/2011	88C	B	W	C1	BP
7/9/2011	89C	B	W	U	IP
7/9/2011	8C	T	P	U	B
7/9/2011	90C	B	W	U	IP
7/9/2011	91C	B	W	U	IP
7/9/2011	92C	B	W	U	IP
7/9/2011	93C	B	W	U	IP
7/9/2011	94C	B	W	C1	BC
7/9/2011	95C	B	W	U	IP
7/9/2011	96C	B	W	C1	BP
7/9/2011	98C	B	W	U	IP
7/9/2011	99C	B	W	U	IP
7/9/2011	9C	T	P	N	B
7/15/2011	100C	B	F	C3	BC
7/15/2011	101C	B	W	U	IP
7/15/2011	103C	B	W	U	IP
7/15/2011	104C	B	F	U	IP
7/15/2011	105C	T	P	U	B
7/15/2011	106C	B	F	U	IP
7/15/2011	107C	T	UC	U	B
7/15/2011	108C	B	W	U	IP
7/15/2011	109C	B	F	U	IP
7/15/2011	10C	B	W	U	IP
7/15/2011	110C	B	W	U	IP
7/15/2011	111C	B	W	U	IP
7/15/2011	112C	B	UC	C1	BC
7/15/2011	113C	B	UC	C2	BC
7/15/2011	114C	B	P	C1	BC
7/15/2011	115C	B	W	E1	IP
7/15/2011	11C	B	W	U	IP
7/15/2011	120C	B	F	U	IP
7/15/2011	121C	B	W	U	BU
7/15/2011	122C	B	W	E1	IP
7/15/2011	123C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/15/2011	12C	B	W	U	IP
7/15/2011	13C	B	W	C2	BC
7/15/2011	14C	U	UC	U	IP
7/15/2011	15C	U	UC	U	IP
7/15/2011	16C	U	UC	U	IP
7/15/2011	17C	U	UC	W	IP
7/15/2011	18C	B	W	E2	IP
7/15/2011	19C	B	W	U	IP
7/15/2011	1C	T	P	U	B
7/15/2011	20C	B	W	U	IP
7/15/2011	21C	B	W	U	IP
7/15/2011	22C	B	W	U	IP
7/15/2011	23C	B	W	E2	BP
7/15/2011	24C	B	W	U	IP
7/15/2011	25C	B	W	U	IP
7/15/2011	26C	B	W	U	IP
7/15/2011	27C	B	W	C2	BP
7/15/2011	28C	B	W	U	IP
7/15/2011	29C	B	W	C1	BP
7/15/2011	2C	T	P	N	B
7/15/2011	30C	B	W	U	IP
7/15/2011	31C	B	W	U	IP
7/15/2011	32C	B	W	U	IP
7/15/2011	33C	B	W	U	IP
7/15/2011	34C	U	UC	U	BU
7/15/2011	35C	B	W	U	IP
7/15/2011	36C	B	W	C1	BP
7/15/2011	37C	B	W	U	IP
7/15/2011	38C	B	W	C1	BP
7/15/2011	39C	B	W	U	IP
7/15/2011	3C	B	W	U	IP
7/15/2011	40C	U	UC	U	IP
7/15/2011	41C	B	W	U	BP
7/15/2011	42C	B	W	U	IP
7/15/2011	43C	B	W	U	IP
7/15/2011	44C	B	W	U	IP
7/15/2011	45C	B	W	U	IP
7/15/2011	46C	B	W	U	IP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/15/2011	47C	B	W	U	IP
7/15/2011	48C	B	W	C1	BP
7/15/2011	49C	B	W	U	IP
7/15/2011	4C	B	W	U	IP
7/15/2011	50C	B	W	U	IP
7/15/2011	51C	B	F	U	IP
7/15/2011	53C	B	W	U	IP
7/15/2011	54C	B	W	U	IP
7/15/2011	55C	B	W	U	BP
7/15/2011	56C	B	W	U	IP
7/15/2011	57C	B	W	U	IP
7/15/2011	58C	B	W	U	IP
7/15/2011	59C	B	W	C1	BP
7/15/2011	5C	B	W	E1	IP
7/15/2011	61C	B	W	U	IP
7/15/2011	62C	B	W	U	IP
7/15/2011	63C	B	W	U	IP
7/15/2011	64C	B	W	C1	BP
7/15/2011	65C	B	W	C2	BC
7/15/2011	66C	T	UC	N	B
7/15/2011	67C	B	W	U	IP
7/15/2011	68C	B	W	C1	BP
7/15/2011	69C	B	W	E1	IP
7/15/2011	6C	B	W	U	IP
7/15/2011	70C	B	W	U	IP
7/15/2011	71C	U	UC	U	IP
7/15/2011	72C	B	F	U	IP
7/15/2011	73C	B	F	U	IP
7/15/2011	74C	T	UC	N	NP
7/15/2011	75C	B	F	U	IP
7/15/2011	75C	B	W	U	IP
7/15/2011	76C	B	W	U	IP
7/15/2011	77C	B	W	U	IP
7/15/2011	78C	B	W	U	IP
7/15/2011	79C	B	W	U	BP
7/15/2011	7C	B	W	U	IP
7/15/2011	80C	B	W	C1	BC
7/15/2011	81C	B	W	C1	BP

Appendix 5 (cont.).

Date	BRAC Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/15/2011	82C	B	F	U	IP
7/15/2011	83C	B	W	C1	BC
7/15/2011	84C	B	F	U	BP
7/15/2011	85C	B	W	U	IP
7/15/2011	86C	B	W	U	IP
7/15/2011	87C	B	F	C3	BC
7/15/2011	88C	B	W	U	IP
7/15/2011	89C	B	W	U	IP
7/15/2011	8C	T	P	N	B
7/15/2011	90C	B	W	U	IP
7/15/2011	91C	B	F	U	IP
7/15/2011	92C	B	F	U	IP
7/15/2011	93C	B	F	E1	IP
7/15/2011	94C	B	P	C2	BC
7/15/2011	95C	B	F	U	IP
7/15/2011	96C	B	P	C1	BC
7/15/2011	98C	B	F	U	IP
7/15/2011	99C	FAILED	P	N	B
7/15/2011	9C	T	UC	N	NP

Site Status
B – Breeding site = confirmed eggs/chicks
T – Territorial site = breeding not confirmed
U – Undetermined
FAILED – First survey when nest discovered to be failed

Nest Condition
P - Poorly built nest
F - Fairly well built nest
W - Well built nest
UC - Unclassified

Nest Contents
N - Empty nest
E - Egg(s), use E1, E2, E3, etc. to indicate number of eggs
C - Chicks(s), use C1, C2, C3, etc. to indicate number of live chicks
CD – Chick(s) Dead, use CD1, CD2, CD3, etc. to indicate number of dead chicks
CU – Chick(s) Undetermined, unable to determine if chick is alive or dead
U - Undetermined

Adult Bird Activity
B - Bird = Bird standing at nest site with no egg or chick present
BE – Bird with egg(s)
BC – Bird with chick(s)
BU - Bird Unknown = Bird standing/sitting at nest site, unknown if egg/chick present
BP – Brooding Posture = Bird lying in nest apparently brooding chicks
IP – Incubating Posture = Bird in nest apparently incubating eggs
NP – Not Present = Bird not present at nest site
U – Undetermined

Appendix 6. Pelagic cormorant nest data collected from mainland south vantage point at Pirate Cove Rock 29 June to 15 July 2011.

Date	PECO Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
6/29/2011	1P	U	W	U	IP
6/30/2011	1P	U	W	U	IP
7/1/2011	1P	U	W	U	IP
7/2/2011	1P				
7/3/2011	1P	B	W	E1	IP
7/4/2011	1P	U	W	U	IP
7/5/2011	1P				
7/6/2011	1P				
7/7/2011	1P	U	W	U	IP
7/8/2011	1P	U	W	U	IP
7/9/2011	1P	U	W	U	IP
7/15/2011	1P	U	W	U	IP
6/29/2011	2P	U	F	U	IP
6/30/2011	2P	U	F	U	IP
7/1/2011	2P	U	W	U	IP
7/2/2011	2P				
7/3/2011	2P				
7/4/2011	2P	B	W	E2	IP
7/5/2011	2P				
7/6/2011	2P				
7/7/2011	2P	U	W	U	IP
7/8/2011	2P	U	W	U	IP
7/9/2011	2P	U	W	U	IP
7/15/2011	2P	U	W	U	IP
6/29/2011	3P	U	W	U	IP
6/30/2011	3P	U	W	U	IP
7/1/2011	3P	U	W	U	IP
7/2/2011	3P				
7/3/2011	3P				
7/4/2011	3P	U	W	U	IP
7/5/2011	3P				
7/6/2011	3P				
7/7/2011	3P	U	W	U	IP
7/8/2011	3P	U	W	U	IP
7/9/2011	3P	B	W	E1	IP
7/15/2011	3P	U	W	U	IP
6/29/2011	4P	T	UC	N	B

Appendix 6 (cont.).

Date	PECO Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
6/30/2011	4P	T	UC	U	B
7/1/2011	4P	T	UC	**E**	B
7/2/2011	4P				
7/3/2011	4P				
7/4/2011	4P	T	P	N	B
7/5/2011	4P				
7/6/2011	4P				
7/7/2011	4P	T	P	N	B
7/8/2011	4P	T	P	N	B
7/9/2011	4P	T	P	N	B
7/15/2011	4P	T	P	N	B
6/29/2011	5P	T	P	U	BU
6/30/2011	5P	T	F	U	B
7/1/2011	5P	T	P	**E**	B
7/2/2011	5P				
7/3/2011	5P				
7/4/2011	5P	T	P	U	BU
7/5/2011	5P				
7/6/2011	5P				
7/7/2011	5P	U	W	U	IP
7/8/2011	5P	U	F	U	IP
7/9/2011	5P	U	W	U	IP
7/15/2011	5P	T	P	N	B
6/29/2011	6P	U	F	U	IP
6/30/2011	6P	U	W	U	IP
7/1/2011	6P	U	W	U	IP
7/2/2011	6P				
7/3/2011	6P				
7/4/2011	6P	T	P	N	B
7/5/2011	6P				
7/6/2011	6P				
7/7/2011	6P	T	P	N	B
7/8/2011	6P	T	P	N	B
7/9/2011	6P	U	P	U	BU
7/15/2011	6P	T	P	N	B
6/29/2011	7P	U	W	U	IP
6/30/2011	7P	U	W	U	IP
7/1/2011	7P	U	W	U	IP

Appendix 6 (cont.).

Date	PECO Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/2/2011	7P				
7/3/2011	7P				
7/4/2011	7P	U	W	U	IP
7/5/2011	7P				
7/6/2011	7P				
7/7/2011	7P	U	W	U	IP
7/8/2011	7P	U	W	U	IP
7/9/2011	7P	U	W	U	IP
7/15/2011	7P	U	W	U	IP
6/29/2011	8P				
6/30/2011	8P	T	P	U	BU
7/1/2011	8P	T	P	U	BU
7/2/2011	8P				
7/3/2011	8P				
7/4/2011	8P	U	W	U	IP
7/5/2011	8P				
7/6/2011	8P				
7/7/2011	8P	B	W	E1	IP
7/8/2011	8P	U	W	U	IP
7/9/2011	8P	U	W	U	IP
7/15/2011	8P	U	W	U	IP
6/29/2011	9P				
6/30/2011	9P	T	P	U	BU
7/1/2011	9P	T	P	U	BU
7/2/2011	9P				
7/3/2011	9P				
7/4/2011	9P	U	W	U	IP
7/5/2011	9P				
7/6/2011	9P				
7/7/2011	9P	U	W	U	IP
7/8/2011	9P	U	W	U	IP
7/9/2011	9P	U	W	U	IP
7/15/2011	9P	U	W	U	IP
6/29/2011	10P				
6/30/2011	10P	U	W	U	IP
7/1/2011	10P	U	F	U	IP
7/2/2011	10P				
7/3/2011	10P				

Appendix 6 (cont.).

Date	PECO Nest ID	Site Status	Nest Condition	Nest Contents	Adult Bird Activity
7/4/2011	10P	U	W	U	IP
7/5/2011	10P				
7/6/2011	10P				
7/7/2011	10P	U	W	U	IP
7/8/2011	10P	U	W	U	IP
7/9/2011	10P	U	W	U	IP
7/15/2011	10P	U	W	U	IP
6/29/2011	11P	T	F	U	BU
6/30/2011	11P	B	F	E1	IP
7/1/2011	11P	U	F	U	IP
7/2/2011	11P	U	F	U	IP
7/3/2011	11P	U	W	U	IP
7/4/2011	11P	U	W	U	IP
7/5/2011	11P				
7/6/2011	11P				
7/7/2011	11P	B	W	EI	IP
7/8/2011	11P	U	W	U	IP
7/9/2011	11P	U	W	U	IP
7/15/2011	11P	U	W	U	IP
6/29/2011	12P				
6/30/2011	12P				
7/1/2011	12P	U	F	U	IP
7/2/2011	12P				
7/3/2011	12P				
7/4/2011	12P				
7/5/2011	12P				
7/6/2011	12P				
7/7/2011	12P				
7/8/2011	12P				
7/9/2011	12P				
7/15/2011	12P	U	W	U	IP

Same code explanation as above (Appendix 5).

Appendix 7. Brandt's cormorant nest data collected at Yaquina Head Seabird Colony Complex (reference site) 27 June to 09 July 2011.

Nest	June				July								
ID	27	28	29	30	1	2	3	4	5	6	7	8	9
B1	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B2	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B3	BE	BC	IP	BE	BE	BE	IP	BE	BE	BE	BC	BE	BC
B4	BC	BC	BC	BC	BC	BC	BC	BC	BC	IP	BC	BC	BC
B5	IP	BC	IP	BE	BE	BE	BE	BE	IP	IP	BE	BC	BC
B6	BE	BE	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B7	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B8	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B9	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B10	BE	BE	IP	BE	BE	BE	BC	BC	IP	IP	BC	BC	BC
B11	BC	BE	IP	BE	BE	BE	IP	IP	IP	IP	BC	BE	BE
B12	BC	BC	BC	BC	BC	BC	BC	BC	BC	IP	BC	BC	BC
B13	BE	BE	BP	BE	IP	BE	BE	IP	IP	IP	BC	BE	IP
B14	BE	BE	BP	BE	BE	IP	BC	IP	BC	IP	IP	BC	BC
B15	BE	IP	BE	BE	BE	BE	BE	IP	IP	IP	IP	BC	IP
B16	BE	BP	BP	BE	BE	BC	BC	IP	IP	IP	IP	BC	BC
B17	BE	BE	BP	BC	BC	NF	NP	NP	IP	IP	IP	NP	NP
B18	IP	BE	BE	BC	BE	BC	BC	IP	IP	IP	BC	BC	BC
B19	BE	BE	BE	BE	BE	IP	BE	IP	IP	IP	IP	BE	IP
B20	IP	IP	B	IP	IP	IP	BE	NF	BC	NP	BC	B	B
B21	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B22	IP	BE	BE	BE	BE	BE	BE	IP	BC	BC	BC	BC	BC
B23	BC	BC	IP	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B24	IP	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B25	IP	BP	BP	IP	IP	IP	IP	IP	IP	IP	IP	IP	IP
B26	BE	IP	BP	BE	BE	IP	IP	IP	IP	IP	IP	BC	BC
B27	BE	BC	BC	BC	BC	BC	BC	BC	BC	IP	BC	BC	BC
B28	IP	BE	BP	BE	BE	IP	IP	BP	IP	IP	IP	BC	BC
B29	IP	BE	IP	BE	BE	IP	IP	IP	IP	IP	IP	IP	IP
B30	BE	BE	BE	BC	BC	IP	IP	BE	IP	BC	IP	BC	BC
B31	IP	IP	BP	BE	IP	BE	IP	IP	IP	BC	IP	BE	IP
B32	BE	BP	BP	IP	BC	IP	IP	IP	IP	IP	IP	IP	BC
B33	BE	BE	BE	BE	BE	BE	IP	BC	BE	BE	IP	IP	BE
B34	BC	BC	BP	BC	BC	BC	IP	BC	BC	IP	IP	NF	B
B35	BE	BE	BC	BC	BE	BC	IP	BP	BE	BC	IP	BP	BC
B36	IP	BE	BP	BC	BE	NF	B	NP	B	B	NP	NP	NP
B37	BE	BE	BE	BE	BE	BE	BE	BE	BE	B	BE	NF	B
B38	BC	BC	BE	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B39	BE	BC	BP	BE	BC	BC	BC	BC	BC	BC	IP	BC	BC
B40	IP	IP	B	NP	B	B	B	B	B	B	IP	BE	BE

Appendix 7 (cont.).

Nest	June				July								
ID	27	28	29	30	1	2	3	4	5	6	7	8	9
B41	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B42	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B43	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B44	BE	BE	BE	BE	BE	BE	BE	BE	BC	IP	BC	BC	B
B45	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B46	BE	BE	BE	BE	BE	BC	BC	BC	BC	BC	BC	BC	BC
B47	BE	BE	BP	BE	BE	BE	IP	BE	BC	BC	IP	IP	IP
B48	BC	BE	BE	BE	BC	BC	BC	BC	BC	BC	BC	BC	BC
B49	BE	BE	BP	BE	BE	U	NP	NP	BE	BE	IP	BC	BE
B50	BE	BE	BE	BE	BE	IP	BE	BE	BE	IP	IP	BC	BC
B51	BC	BE	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B52	IP	NF	U	U	U	U	U	U	U	U	U	U	U
B53	IP	BE	BE	BE	BE	IP	BE	BE	BC	IP	IP	IP	IP
B54	BE	BE	BP	BE	BE	IP	IP	BE	BE	IP	BE	BE	BC
B55	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B56	BE	BE	BE	BC	BC	BP	BE	BC	BC	BC	IP	BC	BC
B57	BC	BE	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
B58	BC	BC	BC	BC	BC	IP	IP	BC	BC	BC	BC	BC	BC
B59	IP	BE	BE	BE	BE	NF	U	NP	IP	IP	BE	IP	IP
B60	BE	BE	BE	BE	BE	NF	B	B	IP	BC	B	B	B
B61	BE	BE	BE	BE	BE	BE	BE	IP	IP	IP	IP	IP	BC
B62	IP	BE	BE	BE	BE	BE	IP	IP	IP	IP	IP	BE	BC
B63	BC	BC	BC	BC	BC	BC	IP	IP	IP	IP	IP	BC	BC
B64	IP	IP	IP	IP	BP	IP	BC	IP	IP	BC	IP	BC	BC
B65	IP	B	IP	BE	BE	BE	IP	IP	IP	IP	BE	BE	BE
B66	BE	BE	BE	BE	BE	IP	IP	IP	IP	IP	BE	BE	IP
B67	IP	B	B	IP	B	B	B	B	IP	IP	B	B	BE
B68	BC	BC	BC	BC	BC	BP	BC	BC	BC	BC	BC	BC	BE
B69	BE	BE	BE	BE	BE	BE	BE	IP	IP	IP	IP	BE	BE
B70	BE	BE	BE	BE	BE	IP	IP	IP	IP	IP	IP	IP	IP
B71	BE	BE	BE	BE	BE	IP	BE	IP	IP	IP	BE	BE	IP

Code Explanation
B = Bird standing at nest site with no egg or chick present
BC = Bird with chick(s)
BE = Bird with egg(s)
BU = Bird at nest site, unknown if egg(s) or chick(s) present
BP = Brooding posture
IP = Incubating posture
NP = Bird not present
NF = Nest failure (first survey when nest discovered to be failed)
U = Undetermined

Appendix 8. Pelagic cormorant nest data collected at Yaquina Head Seabird Colony Complex (reference site) 27 June to 09 July 2011.

Nest ID	June				July								
	27	28	29	30	1	2	3	4	5	6	7	8	9
P1	IP	B	B	BE	IP	NF	B	B	IP	IP	IP	B	B
P2	BE	BE	IP	BE	BE	BE	BE	IP	IP	IP	IP	BE	BE
P3	BE	BE	IP	BE	BE	IP	BE	IP	IP	IP	IP	BE	BE
P4	IP	BE	BP	BE	BE	IP	BE	IP	IP	IP	IP	IP	BE
P5	IP	BE	BE	BE	BE	IP	BE	BC	IP	IP	IP	BE	BE
P7	BE	NF	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
P8	BE	BE	IP	BE	BE	BE	BE	IP	IP	IP	IP	BE	B
P9	BE	BE	IP	BE	BE	U	BE	IP	IP	IP	IP	BE	IP

Same code explanation as above (Appendix 7).

Appendix 9. Western gull nest data collected at Yaquina Head Seabird Colony Complex (reference site) 27 June to 09 July 2011.

Nest ID	June				July								
	27	28	29	30	1	2	3	4	5	6	7	8	9
W1	IP	BE	IP	BE	BE	BC	BC	BC	BE	IP	BC	BC	BC
W2	IP	BE	IP	IP	BE	IP	B	BP	IP	IP	IP	BC	BP
W3	IP	BE	IP	IP	IP	IP	NF	NP	NP	NP	NP	NP	NP
W4	IP	IP	IP	IP	NF	NP	NP	NP	NP	NP	NP	NP	NP
W5	IP	BE	IP	IP	IP	U	BE	BE	IP	IP	BC	BC	IP
W6	IP	BC	BC	BC	BC	U	BC	BC	BC	IP	BC	BC	NP
W7			B	IP	BE	IP	BE	BC	NP	NP	IP	BC	BC

Same code explanation as above (Appendix 7).

Appendix 10. Brandt's cormorant nest data collected at North Coquille Point Rock 28 June to 10 July 2011.

Nest	June			July									
ID	28	29	30	1	2	3	4	5	6	7	8	9	10
B1	IP	IP	IP	BP	IP	IP	IP	IP	IP	U	IP	IP	IP
B2	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	IP
B3	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	IP
B4	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	IP
B5	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	IP
B6	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	BC
B7	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	BC
B8	BU	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	IP
B9	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	IP
B10	IP	IP	IP	BP	IP	NF	NP	NP	IP	IP	NP	NP	NP
B11	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	BC
B12	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	BC
B13	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	IP
B14	IP	IP	IP	BP	IP	IP	IP	IP	IP	IP	IP	IP	IP
B15	IP	BC	BC	BP	IP	BP	IP	BP	BP	BC	BC	BP	BC
B16	IP	IP	IP	BP	IP	BP	IP	IP	IP	BC	IP	IP	IP
B17	IP	IP	IP	BP	IP	BP	IP	IP	IP	BC	IP	IP	IP
B18	IP	IP	IP	BP	IP	BP	IP	IP	IP	BC	IP	IP	IP
B19	IP	U	IP	BP	IP	BP	IP	IP	B	BC	IP	IP	IP
B20	BU	U	IP	BP	IP	BP	IP	IP	IP	BC	IP	IP	IP
B21	IP	U	U	BP	IP	BP	IP	IP	IP	BC	IP	IP	IP
B22	IP	U	U	BP	IP	IP	IP	IP	IP	BC	IP	IP	IP

Same code explanation as above (Appendix 7).

Appendix 11. Pelagic cormorant nest data collected at Table Rock and North Coquille Point Rock 28 June to 10 July 2011.

Nest ID	June			July								
	28	29	30	1	2	3	4	5	6	7	8	9	10
P1	IP	IP	BP	NF	NP	NP	NP	NP	NP	NP	NP	NP	NP
P2	IP	IP	BP	BP	IP	IP	IP	IP	IP	BP	IP	IP	IP
P3	IP	IP	BP	NP	BU	IP	BC	BU	BU	BP	B	B	B
P4	IP	IP	BP	BP	IP	IP	NP	IP	IP	BP	IP	IP	IP
P5	IP	IP	BP	BP	IP	BP	BC	BC	BC	BC	BC	BC	BC
P6	IP	IP	BP	BP	NF	BP	BU	BU	B	B	B	B	B
P7	IP	IP	BP	BP	IP	IP	IP	NP	NP	NP	NP	NP	NP
P8	IP	U	BP	NP	NP	NA	NP	NP	NP	NP	NP	NP	NP
P9	IP	BP	NA	NP	NP	NA	NP	NP	NP	NP	NP	NP	NP
P10	U	U	U	BE	NF	NP	NP	NP	NP	NP	NP	NP	NP

Same code explanation as above (Appendix 7).

Appendix 12. Double-crested cormorant nest data collected at Table Rock 28 June to 10 July 2011.

Nest	June			July								
ID	28	29	30	1	2	3	4	5	6	7	8	9	10
DC1	IP	IP	BC	IP	IP	IP	BP	IP	BC	BC	BC	BC	IP
DC2	BC	BC	BC	BC	BC	BC	BC	U	BC	NP	BC	NP	B
DC3	IP	IP	U	IP	IP	BC	BP	IP	BC	BC	BP	IP	BP
DC4	BC	BC	BC	BC	NP	BC	BC	BC	BC	NP	BC	NP	BC
DC5	BC	BC	BC	NP	BC	BC	BC	BC	B	BC	BC	NP	BC
DC6	BC	BC	BC	BU	BP	NP	BC	BC	U	U	U	U	BC
DC7	BC	BC	BC	BC	BP	NP	U	IP	BC	BC	NP	BC	BC

Same code explanation as above (Appendix 7).

Appendix 13. Western gull nest data collected at Table Rock 28 June to 10 July 2011.

Nest	June			July									
ID	28	29	30	1	2	3	4	5	6	7	8	9	10
G1	BP	BP	BP	BP	BP	BP	B	BP	BC	BP	BP	BC	B
G2	BP	BP	BP	BU	BC	B	BC	BP	NP	BP	BC	BC	BC
G3	BP	BP	BC	BP	BP	BP	BP	NF	D	D	D	D	D
G4	BC	BP	BP	BP	BP	BP	BP	BP	BC	BC	BP	BC	BC
G5	BP	BP	BC	NP	BP	BC	BC	BC	BC	BC	BC	BC	BC
G6	BC	BC	BC	BP	BP	BC	BC	BC	BC	BC	BC	BC	BC
G7	BP	BC	BC	BP	BP	BC	BP	BC	BP	BP	NP	BC	BP
G8	BC	BC	BC	BC	BC	BC	NP	BC	BC	BC	BC	BC	BC
G9	BC	BP	BP	BP	BP	BC	BP	BP	BP	BC	BC	BC	BU
G10	BP	BP	BP	BP	BP	BP	BP	BP	BP	BP	BC	BP	BP
G11	BP	BP	BP	BP	BP	BP	BP	BP	BP	BP	BP	BP	BP
G12	B	BC	BC	BC	BP	BP	BP	BC	BP	BP	BP	BP	BP
G13	BP	BP	B	BP	BP	BC	BC	BP	BC	BC	BC	BP	BC
G14	BP	BP	B	BP	BP	BC	BP	BC	BP	BC	BP	BP	BC
G15	BC	BC	BC	BP	BP	NP	BC	BP	BC	BC	NP	B	NP
G16	BC	BC	BC	BP	BC	BC	BC	BC	BP	BP	BC	BC	BC
G17	BC	BC	BC	BC	BP	NP	BC	NP	BC	BC	BC	BC	BC
G18	BU	BC	BP	BP	B	BC	BC	BP	BP	BP	BP	BC	BC
G19	NP	BC	NP	NP	BP	BP	BC	NP	NP	B	NP	NP	NP
G20	BC	BP	BC	BC	BC	BC	BC	BP	BC	BC	BC	BC	BC
G21	BC	U	BC	BC	BC	BP	BC	BP	BP	BP	BU	U	BC

Same code explanation as above (Appendix 7).

Appendix 14. Brandt's cormorant nest data collected at Chiefs Island 28 June to 10 July 2011.

Nest ID	June			July								
	28	29	30	1	2	3	4	5	6	7	8	9	10
B1	IP	IP	IP	IP	IP	IP	IP	IP	U	BU	BP	BU	BU
B2	IP	IP	IP	IP	IP	IP	IP	IP	U	BU	BU	BU	BU
B3	IP	IP	IP	IP	IP	IP	IP	IP	U	BU	BU	BU	BU
B4	IP	IP	IP	IP	IP	IP	IP	IP	U	BP	BP	BU	BC
B5	U	IP	IP	IP	U	IP	IP	IP	U	BU	BP	BU	BU
B6	U	U	IP	IP	IP	IP	IP	IP	U	BU	BP	BU	BU
B7	U	U	IP	IP	BP	BP	IP	IP	U	BU	BU	BU	BU

Same code explanation as above (Appendix 7).

Appendix 15. Double-crested cormorant nest data collected at Chiefs Island 28 June to 10 July 2011.

Nest	June			July								
ID	28	29	30	1	2	3	4	5	6	7	8	9	10
D1	IP	BC	BP	BP	BP	BU	IP	IP	BU	BC	BC	BU	BU
D2	IP	BC	BC	BC	BC	BC	BC	BC	BU	BC	BC	BC	BC
D3	IP	BC	BC	BC	BC	BC	BC	BC	BU	BC	BC	NP	BC
D4	BP	BC	BC	BC	BC	BC	BC	BC	BU	BC	BC	BC	BC
D5	BP	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC
D6	BP	BC	BC	BC	BC	BC	BC	BC	BU	BC	BC	BC	BC
D7	IP	BC	BC	BC	BC	BC	BP	BC	BC	BC	BC	BC	BC
D8	IP	BC	BC	BC	BC	BC	BC	BC	BC	BC	NP	BC	BC
D9	IP	BC	BC	BC	BC	BC	BC	BC	BU	BC	BC	NP	BC

Same code explanation as above (Appendix 7).

Appendix 16. Western gull nest data collected at Chiefs Island and reef 28 June to 10 July 2011.

Nest ID	June			July								
	28	29	30	1	2	3	4	5	6	7	8	9	10
G5	IP	IP	B	BU	B	BU	IP	B	U	NP	BU	B	BU
G8	IP	BC	BC	BC	BC	BC	NF	NP	U	NP	NP	B	NP
G10	IP	BU	B	B	B	BP	NP	NP	U	BU	NP	NP	NP
G11	IP	BC	NF	B	B	B	B	B	U	U	NP	NP	NP
G12	IP	BC	BC	BC	BC	BC	BC	BC	U	BC	BC	BC	BC
G13	IP	IP	IP	BP	BC	BC	BP	BP	U	BU	BC	BU	BC
G14	IP	IP	IP	BP	BC	BC	BP	BC	U	BC	BC	BC	BC
G15	IP	BC	BC	BC	BC	BC	BC	BC	U	BC	BC	BC	BC
G16	IP	IP	BP	BP	U	IP	IP	IP	U	BU	BU	BU	BC
G17	IP	IP	IP	BP	BC	BC	BP	BC	U	BC	BC	BC	BC
G18	IP	BP	BP	BC	BC	BC	BC	BC	U	B	BC	BC	BC
G19	BC	BC	BC	BC	BC	BC	BC	BC	U	B	BC	BC	BC
G27	U	IP	IP	IP	U	IP	IP	IP	U	BU	BU	BU	BU
G28	U	U	U	U	U	U	U	BC	U	B	BC	BC	BC

Same code explanation as above (Appendix 7).

Appendix 17. Brandt's cormorant nest and territorial site histories as recorded via aerial photographs at Pirate Cove Rock 01 June to 02 September 2011.

Nest ID	Status	1-Jun	9-Jun	2-Jul	3-Jul	4-Jul	5-Jul	8-Jul	2-Sep
1	B	V	V	SWG	SWU	SWU	SWU	SWU	DWE
2	B	V	T	SWU	SWU	SWU	SWU	SWU	VOE
3	B	T	T	SWU	SWU	SWU	SWU	SWU	VWE
4	B	V	T	SWU	SWU	SWU	SWU	SWU	VWE
5	B	V	T	SWU	SWU	SWU	SWU	SWU	VFE
6	B	T	T	SWU	SWU	SWU	SWU	SWU	VWE
7	B	V	T	SFU	SFU	FAILED VFE	VFE	VFE	VFE
8	B	V	SFU	SFU	SFU	SFU	SFU	SFU	VPE
9	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VPE
10	B	T	T	SWU	SWU	SWU	SWU	SWU	VPE
11	B	V	T	SWU	SWU	SWU	SWU	SWU	VPE
12	B	V	DPU	SWU	SWU	SWU	SWU	SWU	DFC
13	B	SPU	SFU	SWU	SWU	SWU	SWU	SWU	VWE
14	B	V	T	SWU	SWU	SWU	SWU	SWU	DPE
15	B	SPU	SPU	SWU	SWU	SWU	SWU	SWU	VOE
16	B	T	T	SWU	SWU	SWU	SWU	SWU	VWE
17	B	T	T	SWU	SWU	SWU	SWU	SWU	VWE
18	B	T	T	SWU	SWU	SWU	SWU	SWU	VWE
19	B	T	T	SWU	SWU	SWU	SWU	SWU	VWE
20	B	T	T	SWU	N/V	SWU	SWU	N/V	VPE
21	B	V	SFU	SWU	SWG	SWU	SWU	SWU	VWE
22	B	V	SPU	SFU	SFU	SFU	SFU	SFU	VPE
23	B	T	T	SWU	DWU	SWU	SWU	SWU	VPE
24	B	T	SPU	SWU	SWU	SWU	SWU	SWU	DFC
25	B	T	T	SWU	SWU	SWU	SWU	SWU	VPE
26	B	T	T	SWU	SWU	SWU	SWU	SWU	VWE
27	B	SPU	SPU	SWU	SWG	SWU	SWU	SWU	VFE
28	B	SPU	SPU	SWU	SWU	SWU	SWU	SWU	VWE
29	B	T	T	SWU	N/V	SWU	SWU	SWU	VFE
30	B	V	SFU	SWU	SWU	SWU	SWU	SWU	VWE
31	B	V	SPU	SWU	SWU	SWU	SWU	SWU	VWE
32	B	V	V	SWU	SWU	FAILED DWE	DWE	DWU	VOE
33	B	V	V	SWU	SWU	FAILED VPE	DPE	SWU	VOE
34	B	V	V	SFU	DFU	SWU	FAILED DPE	SPU	VWE
35	B	V	V	SWU	DWU	DWU	SWU	DWU	VPE
36	B	V	V	SWU	SWU	SWU	SWU	SWU	VFE

Appendix 17 (cont.).

Nest ID	Status	1-Jun	9-Jun	2-Jul	3-Jul	4-Jul	5-Jul	8-Jul	2-Sep
37	B	V	T	SFU	SFU	SFU	SFU	SFU	VFE
38	B	V	T	DWU	SWU	SWU	SWU	SWU	DFE
39	B	V	SPU	SFU	SWU	SWU	SWU	SWU	VFE
40	B	T	T	SWU	SWU	SWU	SWU	SWU	VPE
41	B	T	T	SWU	SWU	SWU	SWU	SWU	DWC
42	B	SPU	SPU	SWU	SWU	SWU	SWU	SWU	DFC
43	B	T	SPU	SFU	SFU	SFU	SFU	SFU	VFE
44	B	T	T	SWU	SWU	SWU	SWU	SWU	VPE
45	B	V	T	SWU	SWU	SWU	SWU	SWU	VPE
46	B	SPU	SFU	SWU	SWU	SWU	SWU	SWU	VFE
47	B	SPU	SFU	SWU	SWU	SWU	SWU	SWU	VPE
48	B	SPU	SFU	SWU	SWU	SWU	SWU	SWU	VPE
49	B	SFU	SWU	SWU	SWU	SWU	SWU	SWU	VPE
50	B	SFU	SFU	SFU	SWU	SWU	SWU	SWU	VFE
51	B	T	T	SFU	SWU	SWU	SWU	SWU	VWE
52	B	SPU	SPU	SWU	SWU	SWU	SWU	SWU	VFE
53	B	SFU	SFU	SWU	SWU	SWU	SWU	SWU	VWE
54	B	SPU	SPU	SWU	SWU	SWU	SWU	SWU	VFE
55	B	T	T	SFU	SFU	SFU	SWU	SWU	VWE
56	B	T	T	SFU	SWU	SWU	SWU	SWU	VWE
57	B	SFU	SWU	SWU	SWU	SWU	SWU	SWU	VWE
58	B	T	T	SFU	SFU	SWU	SWU	SWU	VWE
59	B	SPU	SWU	SWU	SWU	SWU	SWU	SWU	VPE
60	B	T	T	SFU	SFU	SFU	SFU	SFU	VFE
61	B	T	V	SWU	SWU	SWU	SWU	SWU	VFE
62	B	T	SFU	SWU	SWU	SWU	SWU	SWU	VFE
63	B	SPU	SPU	SFU	SFU	SFU	SFU	SFU	VFE
64	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VFE
65	B	V	T	SWU	SWU	SWU	SWU	SWU	VWE
66	B	T	T	SWU	SWU	SWU	SWU	SWU	VWE
67	B	V	SPU	SWU	SWU	SWU	SWU	SWU	VWE
68	B	V	SPU	SWU	SWU	DWU	SWU	SWU	VWE
69	B	V	SPU	SWU	SWU	SWU	SWU	SWU	VWE
70	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VOE
71	B	T	SPU	SFU	SFU	SFU	SFU	SFU	VPE
72	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VFE
73	B	T	T	SFU	SFU	SFU	SFU	SFU	VPE
74	B	SPU	SFU	SWU	SWU	SWU	SWU	SWU	VWE
75	B	V	T	SFU	SFU	SFU	SFU	SFU	VPE
76	B	T	T	SWU	SWU	SWU	SWU	SWU	VPE
77	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VWE

Appendix 17 (cont.).

Nest ID	Status	1-Jun	9-Jun	2-Jul	3-Jul	4-Jul	5-Jul	8-Jul	2-Sep
78	B	V	T	SWU	SWU	SWU	SWU	SWU	VOE
79	B	T	SPU	SFU	SFU	SFU	SWU	SWU	VPE
80	B	SPU	SWU	SWU	SWU	SWU	SWU	SWU	VWE
81	B	T	T	SFU	SFU	SFU	SFU	SFU	VOE
82	B	SPU	SPU	SFU	SFU	SFU	SWU	SWU	VFE
83	B	T	T	SFU	SFU	SFU	SFU	SFU	VPE
84	B	T	SPU	SFU	SFU	SFU	SFU	SFU	VFE
85	B	SPU	SPU	SFU	SFU	SFU	SFU	SFU	VFE
86	B	SPU	SPU	SFU	SFU	SFU	SFU	SFU	VFE
87	B	T	SFU	SWU	SWU	SWU	SWU	SWU	VPE
88	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VPE
89	B	T	SFU	SWU	SWU	SWU	SWU	SWU	VPE
90	B	T	DFU	SWU	SWU	SWU	SWU	SWU	VPE
91	B	T	SFU	SWU	SWU	SWU	SWU	SWU	VPE
92	B	T	SPU	SFU	SFU	SFU	SWU	SWU	VPE
93	B	SFU	SFU	SFU	SFU	SFU	SWU	SWU	VWE
94	B	SPU	SWU	SWU	SWU	SWU	SWU	SWU	VPE
95	B	V	SFU	SWU	SWU	SWU	SWU	SWU	VPE
96	B	T	SFU	SWU	SWU	SWU	SWU	DWU	VFE
97	B	T	SFU	SWU	SWU	SWU	SWU	SWU	VPE
98	B	V	SPU	SWU	SWU	SWU	SWU	SWU	VFE
99	B	V	SFU	SWU	SWU	SWU	SWU	SWU	VWE
100	B	V	SFU	SFU	SFU	SFU	SFU	SFU	VPE
101	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VPE
102	B	T	SFU	SFU	SFU	SFU	SFU	SFU	VPE
103	B	SFU	SFU	SFU	SWU	SWU	SWU	SWU	VWE
104	B	SP	SPU	SFU	SWU	SWU	SWU	SWU	VPE
105	B	SFU	DFU	SWU	SWU	SWU	SWU	SWU	VPE
106	B	T	T	SFU	SFU	SFU	SFU	SFU	VPE
107	B	SPU	DFG	SWU	SWU	SWU	SWU	SWU	DPE
108	B	T	SFU	SWU	SWU	SWU	SWU	SWU	VFE
109	B	V	T	SWU	DWU	FAILED DPE	VPE	SPU	DOE
110	B	SPU	SPU	SFU	SWU	SWU	SWU	SWU	VOE
111	B	SFU	SFU	SWU	SWU	SWU	SWU	SWU	VOE
112	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VFE
113	B	T	SPU	SFU	SFU	SFU	SFU	SWU	VPE
114	B	SFU	SWU	SWU	SWU	SWU	SWU	SWU	VFE
115	B	SPU	SPU	SWU	SWU	SWU	SWU	SWU	VPE
116	B	SFU	SWU	SWU	SWU	SWU	SWU	SWU	VWE
117	B	V	SFU	SFU	SFU	SFU	SFU	SFU	VPE

Appendix 17 (cont.).

Nest ID	Status	1-Jun	9-Jun	2-Jul	3-Jul	4-Jul	5-Jul	8-Jul	2-Sep
118	B	V	T	SWU	SWU	SWU	SWU	SWU	VFE
119	B	V	V	SWU	SWU	SWU	SWU	SWU	VPE
120	B	V	V	SWU	SWU	FAILED DWE	DPE	DPE	VPE
121	B	V	V	SFU	SFU	SFU	SWU	SWU	VWE
122	B	V	V	SWU	DWG	SWU	SWU	SWU	VWE
123	B	V	V	SFU	SFU	SFU	SFU	SFU	VFE
124	B	V	SPU	SFU	SFU	SFU	SFU	SFU	VFE
125	B	T	SFU	SWU	SWU	SWU	SWU	SWU	VPE
126	B	SFU	SFU	SWU	SWU	SWU	SWU	SWU	VWE
127	B	SFU	DFU	SWU	SWU	SWU	SWU	SWU	VPE
128	B	V	SFU	SFU	SWU	SWU	SWU	SWU	VPE
129	B	SPU	SFU	SWU	SWU	SWU	SWU	SWU	VWE
130	B	SPU	SFU	SWU	SWU	SWU	SWU	DWU	VWE
131	B	V	V	SWU	SWU	SWU	SWU	SWU	VFE
132	B	T	SPU	SFU	SFU	SFU	SFU	SFU	VFE
133	B	V	T	SFU	SFU	SFU	SFU	SFU	VOE
134	B	T	V	SWU	SWU	SWU	SWU	SWU	VWE
135	B	T	V	SWU	SWU	FAILED DPE	DPE	SPU	VOE
136	B	V	SPU	SWU	SWU	SWU	SWU	SWU	VFE
137	B	V	SPU	SWU	SWU	SWU	SWU	SWU	VFE
138	B	V	T	SWU	SWU	SWU	SWU	SWU	VPE
139	B	SPU	SFU	SFU	SFU	SFU	SFU	SFU	VPE
140	B	V	SFU	SWU	SWU	SWU	SWU	SWU	VWE
141	B	V	V	SFU	SFU	SFU	SFU	SFU	VFE
142	B	V	V	SFU	SFU	FAILED VOE	VOE	DOE	VOE
143	T	V	V	T	V	V	V	T	V
144	B	V	V	SWU	FAILED VOE	VOE	VOE	VOE	VOE
145	B	V	T	SFU	SFU	SFU	SWU	SWU	VOE
146	B	V	V	SFU	SFU	SFU	SFU	SFU	VOE
147	T	V	V	T	V	V	T	T	V
148	T	V	V	T	V	V	V	V	V
149	B	V	SPU	SWU	SWU	FAILED VPE	VPE	DPE	VOE
150	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VPE
151	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VPE
152	B	SFU	SFU	SWU	SWU	SWU	SWU	SWU	VPE
153	B	SFU	SFU	SWU	SWU	SWU	SWU	SWU	VPE

Appendix 17 (cont.).

Nest ID	Status	1-Jun	9-Jun	2-Jul	3-Jul	4-Jul	5-Jul	8-Jul	2-Sep
154	B	SPU	SPU	SWU	SWU	SWU	SWU	SWU	VPE
155	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VFE
156	B	T	DPU	SWU	SWU	SWU	SWU	SWU	VFE
157	B	SPU	SFU	SWU	SWU	SWU	SWU	SWU	VPE
158	B	T	T	SWU	SWU	SWU	SWU	SWU	VPE
159	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VOE
160	B	SFU	SFU	SWU	SWU	SWU	SWU	SWU	VFE
161	B	SPU	SFU	SWU	SWU	SWU	SWU	SWC	VWE
162	B	SPU	SPU	SWU	SWU	SWU	SWU	SWU	VPE
163	B	T	SPU	SWU	SWU	SWU	SWU	SFU	VOE
164	B	V	T	SWU	SWU	SWU	SWU	SWU	VFE
165	B	T	SFU	SWU	SWU	SWU	SWU	SWU	VOE
166	B	V	T	SWU	SWU	SWU	SWU	SWU	VWE
167	B	T	T	SPU	SPU	SFU	SFU	SFU	VFE
168	B	V	T	SWU	SWU	SWU	SWU	SWU	VWE
169	B	SFU	SFU	SWU	SWU	SWU	SWU	SWU	VWE
170	B	SFU	SWU	SWU	SWU	SWU	SWU	SWC	VFE
171	B	SPU	SFU	SWU	SWU	SWU	SWU	SWC	VOE
172	B	SFU	SWU	SWU	SWU	SWU	SWU	SWU	VOE
173	B	SFU	SFU	SWU	SWU	SWU	SWU	SWC	VFE
174	B	V	SPU	SWU	SWU	SWU	SWU	SWU	VOE
175	B	V	SFU	SWU	SWU	SWU	SWU	SWU	VPE
176	B	T	SFU	SWU	SWU	SWU	SWU	SWU	VOE
177	B	SFU	SFU	SWU	SWU	SWU	SWU	SWU	VOE
178	B	SFU	SFU	SWU	SWU	SWU	SWU	SWC	VOE
179	B	V	SPU	SWU	SWU	SWU	SWU	SWU	VFE
180	B	T	SPU	SWU	SWU	SWU	SWU	SWU	VPE
181	B	SPU	SFU	SWU	SWU	SWU	SWU	SWC	VOE
182	B	DFU	SFU	SWU	SWU	SWU	SWU	SWC	VOE
183	B	T	DPU	SPU	SFU	SFU	SFU	SFU	VOE
184	B	SFU	SFU	SWU	SWU	DWU	SWU	DWC	VOE
185	B	SFU	SFU	SFU	SFU	SFU	SFU	SFU	VOE
186	B	SPU	SPU	SWU	DWC	SWU	SWU	SWC	VOE
187	B	SFU	SFU	SWU	DWC	SWU	SWU	SWC	VPE
188	B	SFU	SFU	SWU	SWU	SWU	SWU	DWC	VOE
189	B	SFU	SFU	SWU	SWU	SWU	SWU	SWU	VOE
190	B	T	SWU	FAILED VOE	VOE	DOE	VOE	DOE	VOE
191	B	T	SPU	SPU	SFU	SFU	SFU	SFU	VFE
192	B	V	V	V	V	SWU	SFU	SFU	VOE

Appendix 17 (cont.).

Status Code:
B = Breeding Site
T = Territorial Site

First Code: Bird Activity
D = Adult standing at nest
S = Adult sitting on nest
T = Adult bird(s) on territory with little or no nest material
V = Vacant site

Second Code: Nest Site Condition
F = Fairly well-built nest
O = No nest material
P = Poorly-built nest
W = Well-built nest

Third Code: Nest Site Contents
C = Chick(s) visible in nest
E = Empty nest
G = Egg(s) visible in nest
U = Undetermined

Other Codes:
FAILED = First survey when nest discovered to be failed
N/V = Nest site not visible - obstructed view